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REPORTS

FROM

COMMISSIONERS:

TWENTY-TWO VOLUMES.

—(17.)—

POLLUTION OF RIVERS;

~~PUBLIC HEALTH.~~

Police Engl & Scotld

Session
1 *February* —— 10 *August* 1866.

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FIRST REPORT

OF

THE COMMISSIONERS

APPOINTED TO INQUIRE INTO

THE BEST MEANS OF PREVENTING THE POLLUTION OF RIVERS.

(RIVER THAMES.)

Vol. I.

REPORT, APPENDIX, AND PLANS.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

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1866.

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COMMISSION.

VICTORIA R.

Victoria, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith.

To Our trusty and well-beloved Robert Rawlinson, Esquire, John Thornhill Harrison, Esquire, and John Thomas Way, Esquire, greeting.

Whereas We have deemed it expedient for divers good causes and considerations that a Commission should forthwith issue for the purpose of inquiring how far the present use of rivers or running waters in England for the purpose of carrying off the sewage of towns and populous places, and the refuse arising from industrial processes and manufactures, can be prevented without risk to the public health or serious injury to such processes and manufactures, and how far such sewage and refuse can be utilised or got rid of otherwise than by discharge into rivers or running waters, or rendered harmless before reaching them; and also for the purpose of inquiring into the effect on the drainage of lands and inhabited places of obstructions to the natural flow of rivers or streams caused by mills, weirs, locks, and other navigation works, and into the best means of remedying any evils thence arising.

Now know ye, that We, reposing great confidence in your zeal and ability, have authorised and appointed, and do by these Presents authorise and appoint, you, the said Robert Rawlinson, John Thornhill Harrison, and John Thomas Way, to be Our Commissioners for the purposes aforesaid.

And for the better enabling you to form a sound judgment on the Premises, We do hereby authorize and empower you, or any two or more of you, to call before you, or any two or more of you, all such persons as you may judge most competent by reason of their situation, knowledge, or experience, to afford you correct information on the subject of this inquiry.

And it is Our further Will and Pleasure that you, or any two or more of you, do report to Us in writing, under your hands and seals, your several proceedings by virtue of this Our Commission, together with your opinion on the several matters herein submitted for your consideration.

And We Will and Command that this Our Commission shall continue in full force and virtue, and that you, Our Commissioners, or any two or more of you, may from time to time proceed in the execution thereof, although the same be not continued from time to time by adjournment.

And for your assistance in the due execution of this Our Commission, We have made choice of Our trusty and well-beloved Godfrey Lushington, Esquire, Barrister-at-Law, to be Secretary to this Our Commission, whose services and assistance We require you to avail yourselves of from time to time, as occasion may require.

Given at Our Court at Saint James's, the Eighteenth day of May 1865, in the Twenty-eighth Year of Our Reign.

By Her Majesty's Command.

(Signed) G. GREY.

INSTRUCTIONS to the COMMISSIONERS.

GENTLEMEN, Whitehall, May 30, 1865.

HER Majesty having been pleased to appoint you to be Commissioners for Inquiry into the Pollution of Rivers, I am directed by Secretary Sir George Grey to send you the following instructions for your guidance in the proposed inquiry.

Although it may be taken as proved generally that there is a wide-spread and serious pollution of rivers both from town sewage and the refuse of mines and manufactories, and that town sewage may be turned to profitable account as a manure, there is not sufficient evidence to show that any measure absolutely prohibiting the discharge of such refuse into rivers, or absolutely compelling town authorities to carry it on the lands, might not be remedying one evil at the cost of an evil still more serious, in the shape of injury to health and damage to manufactures. It is, therefore, suggested that your inquiry should include selected river basins, illustrating different classes of employment and population; that these river basins might be:—

1st. The Thames Valley—both as an example of an agricultural river basin, with many navigation works, such as locks and weirs and mills affecting the flow of water, and many towns and some manufactories discharging their sewage and refuse into the stream from which is mainly derived the water supply of the metropolis.

2d. The Mersey Valley—including its feeders, particularly the Irwell, as an example of the river basin, most extensively polluted by all forms of manufacturing refuse, particularly that arising from the cotton manufacture and processes connected therewith.

3d. The Aire and Calder Basin, as an additional example of the same class, particularly in connexion with the woollen and iron manufactories.

4th. The Severn Basin, for the same reason, but in particular connexion with the great seats of the iron trade.

5th. The Taff Valley, in connexion with mining and industry applied to metals.

6th. A river Basin comprising a mining district in Cornwall.

Your special points of inquiry should, it is conceived, be in the Thames Valley. 1. The condition of the river as affected by mills, weirs, and locks, and as affecting the drainage of towns and villages and adjacent lands. 2. The condition of the river, as affected both by the discharge of sewage from towns and villages, and the refuse of manufactories, paper mills, &c., and the possibility of intercepting and rendering useful or innocuous these sources of pollution.

As to the other rivers mentioned, the main object of the inquiry should be how far the use or abuse of the rivers is, under present circumstances, essential to the carrying on the industry of these districts? How far by new arrangements the refuse arising from industrial processes in these districts can be kept out of the streams,or rendered harmless before it reaches them, or utilised or got rid of otherwise than by discharge into running waters? In the course of these investigations you will make inquiry into the effect on health and comfort of the existing system of sewage of towns and populous places in the districts examined, and into the best mode of protecting individual and public interests in the purity of running water.

Secondary questions will, no doubt, arise contingent on these leading points, in which case you will include them, as far as it is necessary, within the scope of your inquiry.

I am, &c.
(Signed) H. WADDINGTON.

R. Rawlinson, Esq.,
J. T. Harrison, Esq.,
J. T. Way, Esq.,
Commissioners to inquire into the
Pollution of Rivers.

LETTER from H. WADDINGTON, ESQ., to the COMMISSIONERS appointed to inquire into the POLLUTION OF RIVERS.

GENTLEMEN,

Whitehall, July 7, 1865.

I AM directed by Secretary Sir George Grey to transmit to you an extract of a letter from Mr. Charles Neate, and to state that it will be desirable to include in your inquiry into the Pollution of Rivers, the subject of the water supply suggested by Mr. Neate, provided such extension of your inquiry will not materially impede or delay the completion of the primary object of the Commission.

I am, &c.
(Signed) H. WADDINGTON.

The Commissioners appointed to inquire
into the Pollution of Rivers,
2, Victoria Street, S.

LETTER from CHARLES NEATE, ESQ., M.P., to the Right Honorable Sir GEORGE GREY, Bart., G.C.B., M.P.

DEAR SIR,

House of Commons, June 27, 1865.

I BEG to submit to you, with reference to the Commission recently issued to inquire into the means of remedying the pollution of rivers, that as the scope of that Commission has already been enlarged beyond its original and professed object, so as to include an inquiry into the drainage of " lands and inhabited places," it would be right to extend the inquiry still further as to include the great question of the water supply.

Even if the drainage referred to in the Commission is that only which is required for sanitary purposes, it may still be a question whether you might not subject the health of the country to far greater danger by wasting too rapidly the winter supply of water than it now is liable to from the temporary dampness of the soil in certain places.

The effect of drainage, even to the extent it has been already carried out for agricultural purposes, is a subject of serious alarm to many people, and I think it is matter of pressing interest to inquire how far the general level of springs in the country has been lowered, how far it depends upon the height at which the water is maintained in the neighbouring river, and what is the number of springs that have altogether failed, or at least that fail during the summer.

I believe it to be a matter of urgent necessity to provide reservoirs of water throughout the country, to be used for all purposes but drinking, and that the spring water should be habitually confined to that use.

If the Commission, as it stands, is intended to apply to agricultural drainage, the reasons for extending the inquiry are more, still more cogent, for then it is no longer a conflict between one sanitary purpose and another, but between the health of the country and some increase in the productiveness of the soil.

I remain, &c.
(Signed) CHARLES NEATE.

The Right Honorable Sir George Grey,
Bart., G.C.B., M.P., &c., &c., &c.

P.S. I think it would be a great point to inquire whether all the surface drainage of towns might not conveniently be kept out of the service and taken into the rivers.

REPORT.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, the undersigned Commissioners, appointed by Your Majesty's Commission dated the 18th day of May 1865, to inquire "How far the present use of rivers or running "waters in England for the purpose of carrying off the sewage of towns and populous "places, and the refuse arising from industrial processes and manufactures, can be "prevented without risk to the public health, or serious injury to such processes and "manufactures, and how far such sewage and refuse can be utilised or got rid of other-"wise than by discharge into rivers or running waters, or rendered harmless before "reaching them; and to inquire into the effect on the drainage of lands and inhabited "places, of obstructions to the natural flow of rivers and streams caused by mills, "weirs, locks, and other navigation works, and into the best means of remedying any "evils thence arising," Humbly submit the following Report to Your Majesty.

On the 30th of May 1865 we received instructions from Secretary the Right Honourable Sir George Grey that our inquiry should include certain selected river basins, the first in order on the list being the Thames.

Subsequently, on the 7th of July 1865, we received further instructions from Secretary Sir George Grey to the effect that it would be desirable to include in our inquiry the subject of Water Supply, (as suggested by a letter from Mr. Neate, M.P., page 5,) provided that the completion of the primary object of the Commission would not thereby be materially delayed.

In pursuance of our instructions, we have made a personal inspection of the River Thames, and have visited and made public inquiry in the places as set forth:—

Oxford	Oct. 31, 1865
	Nov. 1 ,,
	,, 2 ,,
	,, 3 ,,
	,, 6 ,,
	,, 7 ,,
	,, 8 ,,
	,, 9 ,,
Reading	,, 14 ,,
	,, 15 ,,
	,, 16 ,,
Windsor	,, 28 ,,
	,, 29 ,,
	,, 30 ,,
Kingston	Dec. 12 ,,
	,, 13 ,,
	,, 14 ,,
Richmond	,, 19 ,,
	,, 20 ,,
Lechlade	Jan. 3, 1866
Great Marlow	,, 4 ,,
Worthing	,, 5 ,,
Croydon	,, 16 ,,
South Norwood	,, 18 ,,
	Feb. 8 ,,

We have also for the purpose of taking evidence held sittings in London as follows:—

Rivers Commission Office, No. 2, Victoria Street, Westminster,	Jan. 23.
	,, 24.
	Feb. 7.
	March 2.
	,, 3.

The evidence taken at these public local inquiries and at the sittings of the Commission in London is appended to this Report.

Information has been given to us by members and officers of the Thames Navigation Commission, and likewise by members and officers of the Thames Conservancy Board.

We have availed ourselves of the Report on the Thames made during the past Session of Parliament by a Select Committee of the House of Commons, and also of the three reports made during the period from January 1857 to March 1865 by the Royal Commissioners appointed "to inquire into the best Mode of distributing the Sewage "of Towns, and applying it to beneficial uses."

The waters of the River Thames rise in the Cotteswold hills, in what is usually called the Bath oolite and lias series, Thames Head spring being at a level of 340 feet above Ordnance datum.

1–109. 2501–2586. The geological character of the Thames Valley is described in the evidence of the Rev. J. C. Clutterbuck and Professor Phillips. The river in its course to the sea passes over many distinctive beds of strata, among which are Oxford clay, chalk, and London clay. These formations, and the intermediate strata connected with them, are, in many parts, covered with alluvium, and through and over these several rocks the waters of the main river and of its various tributaries descend. The dry weather, or perennial flow of the Thames, is spring water. There are no lakes or large marshes to store up flood waters of excessive rains, to be gradually liberated to equalize and feed the ordinary stream.

The Thames, from its source to London flows, for the most part, through meadows very little elevated above the river, the strata forming nearly vertical or steeply sloping banks, within which the dry weather and ordinary flow of the water is confined. Some portions of the bed and banks are muddy, but by far the greater length of the river's banks and bed is gravel, rock, clay, or marl. The carbonate of lime and traces of iron found in the oolites, coral-rag, and chalk, give hardness of about 13 to 18 degrees, according to Dr. Clark's test.

The special conditions in the geology and surface configuration of the Thames Basin render the water singularly pure for so large a river. The water, as it flows gently down, has also the power of becoming oxidized and purified to a considerable degree.

The Thames in its course passes through or by the counties of Wilts, Gloucester, Oxford, Berks, Bucks, Middlesex, Surrey, Kent, and Essex. Its greatest length, from the source in Trewsbury Mead to the estuary, is 201 miles. The Thames basin extends in its greatest length, west and east, from about five miles west of Cirencester in Gloucestershire to Shoeburyness, in the county of Essex, and in its greatest breadth, north and south, from Priors Marston in Warwickshire, to Fernhurst in Sussex. The area of the entire basin as taken from the Ordnance map, is about 5,162 square miles, or about 3,303,680 statute acres.

The following is a List of the Tributaries from the North and South into the main River, with the Population, and Number of Mills in the Basin of the Thames, and of the Tributaries above the Pumping Stations of the Metropolitan Water Supply at Hampton.

	Cities, Boroughs, Towns, Parishes, Hamlets.		No. of Mills.	No. of Cities, Boroughs, and Towns, with a Population of 2,000 and over.
	No.	Population.		
The Thames main Stream - - -	217	172,120	61	22
Tributaries North of Thames :				
Churn - - - - -	18	12,165	14	1
Coln - - - - -	19	7,575	9	0
Windrush - - - - -	42	19,814	31	1
Evenlode - - - - -	66	31,966	23	1
Cherwell - - - - -	134	95,469	38	5
Thame - - - - -	100	65,439	18	4
Colne - - - - -	80	129,034	41	19
Tributaries South of Thames :				
Ray - - - - -	8	5,634	4	0
Cole - - - - -	17	15,109	10	1
Ock - - - - -	46	25,259	12	2
Kennet - - - - -	69	100,912	24	10
Loddon - - - - -	78	77,206	22	8
Wey - - - - -	73	82,764	41	9
Mole - - - - -	34	47,622	12	6
	1001	888,088	360	89

The Tributaries flowing into the Thames below the Pumping Stations of the Metropolitan Water-Supply, are—

North of Thames.	South of Thames.
Yedding Brent Lea Roding	Hogs Mill Wandle Ravensbourn Darent

The Cities, Towns, and Places situate on the banks of the River Thames, or on tributaries immediately at their junction with it, and the population as given in the last Census Returns of 1861, are set forth in the following list:—

City, Town, Borough, Township, or Hamlet, on Thames.	Population.	
Somerford, Keynes, Wilts.	386	
Ashton Keynes, Wilts	1,070	
Cricklade	1,820	
Castle Eaton, Wilts	286	
Kempsford, Gloucester	1,007	
Lechlade, Gloucester	1,328	
Eton-Hastings, Berks	185	
Kelmscott, Oxon	141	
Ensham, Oxon	2,096	
Oxford, Oxon	27,560	Part on Cherwell.
North Hinksey, Bucks	438	
South Hinksey, Bucks	636	
Iffley and Littlemore, Oxon.	1,004	
Sandford, Oxon	376	
Abingdon, Berks	6,059	Part on Ock.
Sutton Courtney, Oxon	974	
Culham, Oxon	474	
Appleford, Berks	288	
Long Wittenham, Berks	583	
Little Wittenham, Berks	134	
Clifton Hampden, Oxon	355	
Burcott, Oxon	172	
Wallingford, Berks	2,922	
Crowmarsh, Oxon	360	
Dorchester, Berks	925	On Thame, but near Thames.
Benson, Oxon	1,157	
Moulsford, Berks	180	
South Stoke, Oxon	810	
Goring, Oxon	947	
Streatley, Berks	552	
Pangbourn, Berks	753	
Whitchurch, Berks and Oxon.	857	
Purley, Berks	193	
Mapledurham, Oxon	486	
Caversham, Oxon	1,783	
Carried forward	59,297	
Brought forward	59,297	
Reading, Berks	25,876	Part on Kennett.
Sonningtown, Berks	465	
Shiplake, Oxon	621	
Wargrave, Berks	1,806	
Henley, Oxon	3,676	
Hurley, Berks	1,184	
Great Marlow, Bucks	4,661	
Little Marlow, Bucks	790	
Cookham, Berks	2,438	
Maidenhead, Berks	3,895	
Taplow, Bucks	811	
Bray, Bucks	2,936	
Eton, Bucks	3,122	
Clewer, Berks	5,418	
Windsor, Berks	8,676	
Datchett, Bucks	982	
Egham, Berks	4,864	
Staines, Middlesex	2,749	
Laleham, Middlesex	613	
Chertsey, Surrey	6,589	
Shepperton, Middlesex	849	
Walton, Surrey	4,010	
Weybridge, Surrey	1,603	
Sunbury, Middlesex	2,332	
Hampton, Middlesex	3,361	
Moulsey, West, Surrey	459	
Moulsey, East, Surrey	1,568	
Thames Ditton, Surrey	2,253	
Long Ditton, Surrey	1,011	
Kingston, Surrey	17,792	
Hampton Wick, Middlesex	1,994	
Teddington, Middlesex	1,183	
Total	179,884	

The main stream of the River Thames is said to have been navigable "time out of "mind." It has been described as "a common highway." It is now navigable from the estuary, nominally to Lechlade, but practically not beyond Oxford. There are numerous canals which form junctions with the navigable part of the river, viz.,

Name of Canal.	Point of Junction with Thames.
North Wilts - - - -	Cricklade.
Thames and Severn - - -	Lechlade.
Oxford - - - - -	Oxford.
Wilts and Berks - - -	Abingdon.
Kennet and Avon - - -	Reading.
Basingstoke - - - -	Weybridge.
Surrey and Sussex - - -	Do.
Grand Junction - - -	Brentford.
Paddington and Regent's - -	Limehouse.
Lea and Stort Navigation - -	Do. and Blackwall.
Thames and Medway - - -	Gravesend.

The jurisdiction over the Thames is at present divided between two bodies, the Thames Commissioners and the Thames Conservancy Board, the powers of the former extending from Cricklade to the City Stone above Staines Bridge, and of the latter from the City Stone above Staines Bridge to Yenleete in Kent.

The Thames Commissioners were constituted and derive their powers under the following Acts of Parliament:—

24 Geo. 2. c. 8.
11 Geo. 3. c. 45.
15 Geo. 3. c. 11.
28 Geo. 3. c. 51.
35 Geo. 3. c. 106.
52 Geo. 3. c. 47.

The Commissioners consist* of the following:—

I. *Ex officio* members, viz., the representatives in Parliament for the counties of Wilts, Gloucester, Berks, and Bucks, and for all the cities and boroughs within those counties, and for the University of Oxford; also the representatives in Parliament for the counties of Middlesex and Surrey, and for the cities of London and Westminster and the Borough of Southwark; the Lord Mayor and Aldermen of the City of London, the Vice-Chancellor and heads of college and halls in the University of Oxford, the Dean and Canons of Christ Church, the Dean and Canons of Windsor, the Provost and Fellows of Eton College, the rectors and incumbents of the several parishes that border upon the Thames and Isis on both sides, from Staines to Cricklade, the Mayors and Recorders of Oxford, Abingdon, Wallingford, Reading, Henley, Maidenhead, and Windsor, the senior Bridge-Warden of Great Marlow, and the Clerk of Her Majesty's Board of Works residing at Windsor Castle for the time being.

II. Others, falling under any one of the following denominations:—

1. Every person having an estate in any of the counties of Wilts, Gloucester, Oxford, Berks, and Bucks, of value of 100*l.* per annum.
2. Heir apparent of some person having an estate in any of the above counties of value of 200*l.* per annum.
3. Every resident in any of the above counties who—
   - *a.* Owns land in Great Britain of 100*l.* per annum; or,
   - *b.* Is heir apparent of any person owning land in Great Britain of 200*l.* per annum; or,
   - *c.* Possesses 3,000*l.* personalty; or,
   - *d.* Is a bondholder upon the navigation to the amount of 500*l.*

But before acting all who are not ex-officio members are required to swear to their qualification, and all including ex-officio members are required to take an oath that they will rightly discharge their duties. The present number of persons entitled to act as Commissioners, if they took the necessary oath, is between 600 and 700. Practically the management is vested in a Committee of 15 Commissioners chosen from five districts, into which the navigation is divided, three from each; but the proceedings of that Committee are controlled by general meetings of the Commissioners. The powers of the Commissioners are strictly limited to powers for the benefit of the navigation.

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* 35 Geo. 3. c. 106. s. 25.

The powers of the Conservators of the Thames are more extended: they are derived from

20 & 21 Vict. c. 147.
27 & 28 Vict. c. 113.

The establishment of the Conservancy Board thus dates only from 1857. It arose out of a compromise, as to disputed rights, between the Crown and the Corporation of the City.

By the powers of the former Act the Board was constituted of 12 members, viz.:—

The Lord Mayor.
2 Aldermen of the City.
4 Members of Common Council of the City.
The Deputy Master of the Trinity House.
2 to be appointed by the Admiralty.
1 ,, by the Board of Trade.
1 ,, by the Trinity House.

To these 12, 6 more were added by the latter Act, viz.:—

2 to be elected by owners of shipping.
1 ,, ,, steamers.
2 ,, ,, lighters and steam tugs.
1 ,, ,, occupiers of docks.

Thus the Conservancy Board consists of 18 members, 6 of whom are representatives of the commercial interests of the river.

This preliminary statement enables us to proceed to the consideration of the special points of our inquiry, namely "The condition of the river as affected by mills, weirs, and "locks, and as affecting the drainage of towns and villages and adjacent lands. 2. The "condition of the river, as affected both by the discharge of sewage from towns and "villages, and the refuse of manufactories, paper mills, &c., and the possibility of inter-"cepting and rendering useful or innocuous these sources of pollution."

The result of the evidence as to that part of the Thames, which is under the control of the Thames Commissioners, may be stated generally, as follows:—

Many of the weirs and locks are old and in a ruinous condition from decay and neglect. The rude and antiquated mode of working the navigation by "flashes" still prevails and is highly injurious. Some of the weirs retain a head of water so as to prevent land-drainage, and permanently to waterlog large areas of agricultural land on both margins of the river. At Oxford the suburbs and even urban portions of the city are at times seriously, and as regards the health of the inhabitants dangerously, flooded by reason of the impediments offered to a free flow of the flood-water by Sandford and other weirs. Other towns and villages and large tracts of agricultural land are injuriously inundated by flood-waters from similar causes, and because there are no retaining embankments, or systematic main and tributary outlet drains provided to keep the river within defined limits. Injury is caused to the river by irregular practices in drawing water from certain reaches, ponds, and weirs for fishing. The growth of weeds is not checked, and if weeds are cut by any riparian proprietor or miller or by any other person, there is no rule or supervision to cause such weeds to be removed from the stream, but they are floated onwards from mill to mill, and allowed to accumulate in shallows or on aits or islands to form banks and to do other mischief. The banks of the river are not systematically maintained, but the water is suffered to waste land and make land uncontrolled, as flashes and also as floods may effect. Ballasting the bed of the river is irregularly carried on, so that holes may be deepened where they are dangerous, whilst shallows become worse. There is no systematic dredging, and the channel is, in parts, silted up. This general neglect constitutes a common loss; to the navigation, by impediments to trade; to millers, by excessive floods; and also to riparian proprietors and the communities dwelling on the banks of the river.

Throughout the whole course of the river from Cricklade to the point where the
metropolitan sewerage commences, fouling of the water by sewage from cities, towns, 5531.
villages, and single houses, generally prevails. The refuse from paper mills, tanneries, 3986, 7.

&c. passes into the stream. There is no form of scavenging practised for the surface-water of the Thames, but carcases of animals float down the stream until wasted by corruption. The river water receives unchecked the whole of the pollution, solid and fluid, of the district; and this same water, after it has been so polluted, is abstracted, sand-filtered, and pumped into the metropolis for domestic uses.

Sewage Irrigation.—The Commissioners appointed to "inquire into the best mode of "distributing the sewage of towns, and applying it to beneficial and profitable uses," in their third and final report delivered in the month of March last year, expressed as the conclusion to which they had unanimously come, after an investigation extending over eight years, that "The right way to dispose of town sewage is to apply it con-"tinuously to land, and that it is only by such application that the pollution of rivers "can be avoided."

Fully concurring with this conclusion we have not re-opened the consideration of the numerous and diverse expedients for the disposal of town sewage, (though with respect to none of them have we declined to receive such evidence as has been tendered to us,) but we have thought we should best fulfil our instructions by restricting ourselves to the inquiry whether the absolute prohibition of discharge of sewage into rivers, or the absolute compulsion of town authorities to apply it to the land would result in injury to health or entail other inconvenience.

All expedients for disposal of town sewage otherwise than by application to land seem to us on one ground or another objectionable. Cesspits in towns corrupt the air and corrupt well-water; they are incompatible with public health and should be abolished. Sewerage has therefore become a necessity for any large community. The difficulty is to deal with the volume of sewage thus concentrated, so as not to cause a nuisance either in the atmosphere or in rivers. Disinfectants and filtration have been tried in many forms, but without success. As applied to sewage, disinfectants do not disinfect, and filter beds do not filter. Both attempts have been costly failures. The Local
8448. Board of Health at Croydon at one time were spending large sums annually on chemical and mechanical experiments to no purpose, but to expose themselves to law suits; they then commenced the process of sewage irrigation.

In order fully to ascertain the effects upon health of sewage irrigation, we have visited the principal places at which that process is carried on, viz.:—

Croydon, Worthing, Edinburgh.
Norwood, Carlisle,

We also held open public inquiries at Worthing, Croydon, and Norwood.

7742–8163. At Worthing we found the sewage works, which have now been in operation for more
8160, 8161. than a year, unobjectionable. Not a single case of sickness was attributed to the
8165–8560. irrigation. With regard to Croydon, the inhabitants of that town generally cannot suffer
from their irrigation fields, the sewage farm at Beddington being at a distance of about
three miles from the town. At the public inquiry all the witnesses, medical gentlemen
and others, were agreed that the irrigation works were not injurious to health. As
9130–9542. to the irrigation works at Norwood, no complaints have been made by the persons
representing that district upon the Local Board of Health at Croydon, and the general
rate of mortality in Norwood is low. Some dissatisfaction, however, is felt by one or two
proprietors and occupants of house property in the immediate neighbourhood of the
9312. works; and Dr. Cresswell, one of the local practitioners, stated that the question
had occurred to him as one worthy of investigation, whether certain peculiar cases of
illness, resembling ague, which he had met with in the district, might not have been
caused by miasma from the irrigated fields. The works are inconveniently near to the
outskirts of the town, and may exercise a depreciatory influence on the value of adjoining
houses; but, on the whole, we are satisfied that no ground exists for serious appre-
hension of miasma from fields irrigated with sewage.

If sewage irrigation had really bred a special class of diseases, it would hardly have been tolerated for two centuries on so vast a scale near Edinburgh.

It is necessary not to mistake instances of abuse for defects in the system of sewage irrigation. Sewage, if fresh, and in the open air, is scarcely perceptible to the smell. If sewage be pent up in sewers and discharged on the land in a state of active putrescence; or if, as took place once at Norwood, the depositing tank is allowed to get out of order; or if, as at Edinburgh, the carriers are so rudely constructed and so neglected as to become reservoirs of stagnant sewage and accumulating places of corrupt sewage deposit, unpleasant, if not mischievous, consequences must be expected; but these are cases of abuse, preventible by common care.

Sewage water, if passed over a sufficient area of grass land, passes off bright, tasteless, and without smell. At Croydon, ever since the town was sewered (about the year 1852), the sewage of about 17,000 of the inhabitants has been discharged into the River Wandle, a clear trout stream which breaks out from the chalk above the town and flows, as ornamental water, through residential properties. For fouling this stream the Local Board of Health, so long as they resorted to chemicals to purify their sewage, were exposed to continual litigation. They then commenced the irrigation process upon land at Beddington, and discharged the effluent water from their irrigated fields into the Wandle. Mr. Gurney, finding a dearth of water at his mills, applied to the Local Board for leave to bring the effluent water from the sewaged fields into the Wandle at a point above his mills; and having obtained leave, formed at his own expense a conduit of considerable length, whereby the effluent water is now conducted through his grounds by the side of his carriage drive into the river as it flows through his estate. It appears, from the evidence both of Mr. Gurney and of his agent Mr. Reynolds, who resides upon the estate close to the outfall at Beddington, that there is still occasional cause to complain of the condition of the effluent water, as it sometimes comes off the land either turbid or so imperfectly cleansed from sewage that it pollutes both the River Wandle and the atmosphere in the vicinity. These evils, so far as they exist, we are satisfied admit of explanation. When the water is turbid (as distinct from being foul from sewage), the cause probably is, as suggested by Mr. Gurney, that cattle sent in to graze upon the irrigated fields, (a very large number in proportion to the acreage,) have trodden the surface and fouled it with their dung. When the effluent water flows off, carrying both to sight and smell unmistakable signs of sewage, it has not been applied to a sufficient area of land. The smell has been found most objectionable on Sunday evenings, probably, because the men have on those days neglected to do the amount of work necessary to effect a proper distribution of the sewage. Mr. Reynolds expressly states that the grievance is only occasional; that at other times the water comes down as pure to look at as he could desire, as pure as the river water; that he has no fault to find with sewage irrigation if properly managed; that, on the contrary, he believes it to be a great principle, and thinks it a pity that it should be called in question through the neglect of those who conduct the works. If at any time Mr. Gurney finds the effluent water objectionable, he has only to close his conduit and keep the water out. This hitherto he has not done. 9653, 9654. 9686. 9645.

Sewage irrigation requires to be undertaken and conducted with strict attention; the site must not be too near to dwellings, adjoining wells should be watched, and if the soil be very porous, disused; the sewage must be applied fresh, and over a sufficient area of land. If these conditions are observed, irrigation will be found to be the mode of dealing with sewage which results in the largest amount of good to the land and the smallest amount of harm to flowing water.

There may be difficulty in some cases in finding land available for sewage irrigation, but, with the exception of lands liable to be flooded, there seems to be no soil that will not serve the purpose. Between the light and blowing sands of Edinburgh and the stiff clay of South Norwood are included all the mechanical differences of soil which can be met with in this country, but at both extremes we find the application of sewage attended with success. In some respects, indeed, a heavy clay is even more suitable than lighter soils; from its very nature it is more productive of healthy vegetation; and from its well known chemical properties, it is more effective in the purification of sewage.

The same land will serve the purpose of sewage irrigation continuously. The process to the soil is one not of exhaustion, but of constant renovation. Part of the Craigentinny meadows has been continuously irrigated for two centuries. Sewage can be pumped any height and carried any distance. Its conveyance therefore to a given point is merely a matter of cost. There is no real difficulty in dealing with sewage, whether the volume be, as at Norwood, a few gallons per head, or, as we are informed that it is at Croydon, from two to four times as great as the water supply of that town.* On a clay soil (or wherever pumping is necessary) it is desirable to restrict the dilution. On a gravelly porous soil on the contrary, as shown by Mr. Marriage, it is an advantage that the sewage should be largely diluted, since it is then much more readily distributed over the surface.

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* The supply of water at Croydon is about 30 gallons for each person per day. Subsoil water and rain bring this volume occasionally up to 150 gallons per head of the population.

If a farm be large enough, there is no time when some portion of the land may not be capable of receiving the sewage. The process of irrigation may go on day and night, in wet and drought, in summer and in winter. At Croydon, where advantage is taken of gravitation, the sewage (though varying in volume at different hours) does run upon the land unintermittently, "continuous as time itself." This is a matter of first importance, regard being had to the necessity that sewage, as soon as produced, should be removed from the town and be applied whilst fresh.

The powers which towns now possess for the purposes of applying their sewage to land are contained in—

Public Health Act, 1848 - - -	11 & 12 Vict. c. 63. ss. 45, 46*, 84.
Local Government Act, 1858 - -	21 & 22 Vict. c. 98. ss. 30, 68–75.
Local Government Amendment Act, 1861 -	24 & 25 Vict. c. 61. ss. 4–7.
Sewage Utilization Act, 1865 - -	28 & 29 Vict. c. 75.
Land Improvement Act, 1864 - -	27 & 28 Vict. c. 114.

21 & 22 Vict. c. 98. s. 30. At present there is no power of taking land for sewage irrigation except by agreement. If, however, the application to land of town-sewage be no longer optional, it will be necessary that towns should be furnished with adequate powers to take land compulsorily for irrigation; the exercise of such powers might be made subject to proper restrictions to prevent abuse.

The cost to a town of sewage irrigation depends upon the balance of expenditure and profit. This must vary in different places.

In the selection of a site for irrigation due regard should be had to economical considerations. The cost of conveying the sewage depends partly upon the distance, but still more upon the height to which it is to be pumped, the volume to be pumped, and the price of coal. Laying main pipes an additional length of a mile or two through open country involves an outlay, the interest of which may be trifling as compared with the annual expense of pumping. Unless, therefore, there is much difference in the price of land, it would be cheaper to let the sewage flow by its own gravity a distance down the valley than to pump it to an adjoining upland. But saving in the first cost of land may be more than a set-off against the expense of additional piping and of pumping even to a considerable height. If all the land in the immediate neighbourhood of a town is building land, and none is to be had except for an inordinate price, the circumstance need create no difficulty; it will only be necessary to go farther for a site where land is to be had
8311. at a lower value. The Croydon Local Board of Health, as would appear from the evidence of
8387. their chairman and their engineer, are prepared, in the event of their being refused a renewal
(on reasonable terms) of their present lease of Beddington Farm, to pump their sewage to an elevation of 150 feet, so as to command land at a distance.

It is not necessary that the cost of preparing the land for sewage irrigation should be great. The carriers and distributing branches, whether made as open trenches or of earthenware or cast iron piping, need not be costly. Whether the liquid is pumped or flows to its destination its distribution over the land should always be effected by gravity.

"Filtration" in the sense in which the term is used of filtering water for domestic uses, is not applicable to sewage. Town sewage cannot be *filtered* through an ordinary sand filter, either by the downward or upward process; nor is it necessary in any case to attempt this form of filtration for sewage. Mechanical deposition and separation of grit and flocculent matter are alone required, and these operations can best be performed in open canal-like tanks.

Fields irrigated with sewage can be used for horses and milch cows to graze upon, and will fatten cattle and sheep. But there are practical objections to such use. Cattle grazing in a sewaged field tread the surface and foul it with their dung, and are apt also to tread down the banks of the sewage-carriers and thereby to foul the effluent water. Dung, so applied, is not required for manure by the owner of a sewage farm. Sewaged fields will yield wholesome hay; but in this uncertain climate there would be great difficulty in making hay from crops of grass so heavy. Where irrigation is carried on upon a large scale, if the crops are to be converted into hay, probably some artificial process of haymaking will be required.

The most profitable course is we believe to sow Italian rye grass, and to sell the crop fresh cut as food for horses and cows. A field will in the year produce four or five crops, each of extraordinary weight. How often the grass should be resown depends upon a balance of considerations. Crops from the same seed annually deteriorate; on the other hand, to break up the soil involves temporary suspension of crops, additional labour, and other expenses. At Norwood, where sewage operations commenced only a year ago, the tenant has already over part of the farm had crops of 50 9524. tons per acre, and expects in the ensuing year to obtain about 50 tons per acre uniformly over the whole. At Edinburgh the strips of irrigated land are let yearly at public roup, and fetch from 20*l.* to 40*l.* per Scotch acre. At Croydon the meadows are equally productive. At Worthing part of the sewage from a population of about 9,000 persons was applied last year (1865) to 25 acres of land. The value received for the produce was 645*l.*, or about 25*l.* 16*s.* per acre. The expenses incurred were 229*l.*, viz. :—

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* See Haywood v. Lowndes, 28 L. J. (N. S.) ch. 400.

For labour	-	£164
,, sundries	-	65
		£229 or at the rate of 9*l.* 3*s.* per acre.

leaving a balance of 16*l.* 13*s.* per acre for rent and interest on outlay.

After a consideration of the actual results, extending over a number of years and obtained at various places and under various conditions, we confidently endorse the third conclusion of the last report of the Royal Commission to which we have already referred, that "When local circumstances are favourable, and undue expenditure is "avoided, towns may derive profit, more or less considerable, from applying their sewage "in agriculture. Under opposite circumstances there may not be a balance of profit; "but even in such cases a rate in aid, required to cover any loss, needs not be of "large amount."

Upon many points connected with sewage-farms it would be unwise to lay down any fixed rules, the proper course varying under different conditions of soil, climate, lie of the land, &c., or remaining yet undetermined. For instance, as to what is the most convenient disposition of the main carriers and distributing branches; what area of land suffices to purify a given quantity of sewage; how often and at what times relatively to the state of the crop such volume should be applied; the comparative effects of more and less diluted sewage; the comparative value of light soil and heavy soil under sewage irrigation; these and other like questions we prefer to leave to be settled by further experience. But we would suggest that in carrying out sewage irrigation the following points should be attended to;

1. The irrigated fields should be at least one mile from the town, and if possible in the direction of North or East.

2. The extent should be not less than in the proportion of one acre to every 150 inhabitants whose sewage is to be applied.

3. The carriers should be so constructed as to retain as little residuum of the sewage as possible.

4. Care should be taken so to appropriate the land as to leave for each day a sufficient area available for irrigation.

The above remarks apply to the utilization of sewage of towns of a considerable size; but sewage irrigation on a smaller scale is practicable. It is carried out, for instance, at Broadmoor asylum, under the superintendence of Mr. Menzies, in the manner described by him in his paper (Appendix No. 18). The success of these works is attested by a letter from the Chairman of the Board of Supervision of the Asylum, the Right Honourable Sir W. G. Hayter, Bart. (Appendix Nos. 19, 20), who likewise permitted us to visit Broadmoor and see the works in operation. Sewage irrigation is also successfully carried on at Stafford county gaol and lunatic asylum; particulars were furnished to us by the governor of the gaol, and will be found in the Appendix Nos. 15, 16, 17.

Nor is there any difficulty in dealing with the sewage of isolated houses. In such cases the Rev. Mr. Moule's dry earth system may be advantageously employed; but, independently of this, direct application to land of such sewage is both easy and profitable.

There is no reason why all sewage, whether from towns, villages, or separate houses, should not be applied to land instead of being passed direct into flowing water.

Pollution of the Thames by Sewage.—With regard to the state of the Thames, the evidence shows that all towns and places situated on its banks more or less pollute the river water with sewage. The amount of pollution from un-sewered and un-drained towns, such as Cirencester, Cricklade, and Lechlade, is apparently small, though it is impossible to estimate the amount of liquid which finds its way from cesspits into the river. Towns like Oxford and Reading, although not systematically sewered and drained, add largely to the pollution of the river. Windsor and Eton, which have been more fully sewered and drained, pour out continuously a much larger proportionate volume of sewage.

The usual well-known effects follow; much of the flocculent insoluble matter floats down the stream until caught by vegetation or deposited on the banks. The weeds and banks for a considerable distance thereby acquire a disgusting slimy appearance, and when exposed to the sun, smell most offensively. The rest of the insoluble part of the sewage accumulates in the bed of the river at or near the point of discharge, and there lies, a mass of putrescent matter, sometimes to the extent of many feet in depth. If, as frequently happens in summer, the level of the water sinks so as to lay bare a portion of the bed, an offensive exhalation takes place. In other cases this foul matter remains at the bottom of the river, undergoing decomposition, until stirred by boatmen or raised piecemeal by the gases of putrescence, or swept up by the violence of floods, and then floats down to transfer its corruption to the stream and banks at a lower point.

Oxford is only partially sewered, nevertheless by its existing sewers it commits, to
273. use the emphatic expression of Dr. Adams, "a great outrage upon the Cherwell and Isis."
The foul condition of the outlets of the sewers, and their noxious effects upon residences
896. 1487. in the vicinity, are described by Professor Daubeny and Sir Benjamin Brodie.
Dr. Rolleston states that "his attention has been repeatedly drawn to the repulsive fact
2171. "of the presence in the river of a great amount of human ordure, both freely floating
2150. "and floating entangled." Dr. Acland's experience of the water immediately below
Oxford is that it is now unfit for drinking. Mr. Alderman Towle stated that the
1665. increasing impurity of the stream has rendered it useless for the manufacture of white paper.

At Reading, a system of cesspools still prevails; there are also numerous open privies
3272, 3, 4. discharging direct into the water. According to Mr. Clarke, the Kennet (which just
before its junction with the Thames flows through the town), is in a deplorably filthy
3766. state. Mr. Bulley, one of the resident surgeons, has observed human ordure resting upon the surface of the river in a particular part for days together, owing to the lock-gates not having been opened. It was stated in evidence that night-carts have been emptied into the river, but without the knowledge of the authorities. Last year the medical officer specially appointed for the whole district of the Union, had occasion to
3642–3644. report that part of the river was choked with refuse, and an order was given by the Local Board of Health for the accumulation to be cleared away; this was accordingly done to the extent in one place of 25 feet in width, and in another of 40 feet, by setting the refuse in motion down the river. Much refuse still remains at the bottom of the river, to the depth, as we were informed, of no less than 12 feet.

Richmond is partially sewered, and the Thames opposite to it suffers a corresponding pollution. But this pollution is greatly aggravated in two respects: Firstly, the tidal
5999. action of the river, forces back upon Richmond not only sewage which has been discharged from its own sewers, but also large quantities of filth and refuse from the towns between it and the metropolis; Secondly, from causes hereafter to be considered,
6674. the low-water line has considerably abated in the portion of the river near Richmond,
6361. and in consequence on each margin there is left exposed a larger area of foreshore upon which sewage when discharged from the sewers, rests until the return of high water.

Kingston is situated at a point below the pumping stations of the Metropolitan water companies, but above Teddington lock, where the tidal action of the river ceases. In the course of last year Kingston sewerage was the subject of litigation. The borough authorities being empowered by Act of Parliament to dispose of the town sewage in any one or more of several specified ways, amongst others, "by passing it into a public river, so as not to create a nuisance," were proceeding to enlarge a sewer into the Thames; the Thames Conservators applied for an injunction to restrain the Commissioners, but Vice Chancellor Sir W. Page Wood declined to grant it, and the grounds of his decision were that it had not been proved that a nuisance either had been or would be occasioned. To infer, however, from this that Kingston sewage is innocuous to the river would be erroneous. It needs only a reference to the Vice Chancellor's judgment to prove, what is notorious, that the legal term "nuisance" is a relative term. Whether the enlarged sewer would be held to create a nuisance would depend not so much upon the volume of its contents as upon the previous state of the river. Now the Thames opposite Kingston was already fouled by sewage. It received the sewage of the whole of Surbiton and (discharged at several outlets) about half of the sewage of Kingston. The proposition of the Corporation was to collect the whole of the sewage into one main intercepting sewer, and to discharge it at one of the previously existing outlets; and this, under the circumstances, the Vice Chancellor held, formed no sufficient ground for the interference of the Court. The case, therefore, properly understood rather proves that the Thames was foul before, than that it would not be fouled by the additional influx of half the Kingston sewage. The evidence delivered both in the cause itself and before this Commission proves that the daily discharge of the sewage of several thousands of persons renders the banks and the stream in the vicinity disgusting to the sight and frequently offensive to the smell. 5256.

Windsor may be taken as an example of the discharge into the river of the sewage of a provincial town. Windsor contains nearly 9,000 inhabitants, and has been extensively sewered. The main sewer of the town passes through the Home Park and there delivers its contents into the Thames close to the "Queen's drive." The Castle sewer also crosses the Home Park and has its outfall near to the same point. No expense has been spared in the construction of the sewers; they are regularly flushed and receive all requisite attention.

We quote from a paper furnished to us by Mr. Menzies, and to be found in Appendix No. 13.

"If we have in any two consecutive months in the winter an aggregate rainfall of between four and five inches over the country generally, the river will rise about four feet six inches, and for the time being completely shut the mouth of the main sewer from the town, and also the new drain from the castle. This happens I may say every winter. In February of last year, 1865, it lasted six weeks. During the whole of that time none of the solid matter from the town and castle could pass into the river, and it consequently accumulated in the sewer for a length of 600 yards at least from the river upwards through the Home Park towards the Long Walk and lay in the sewer until it became most offensive and putrid. Had this flood risen one foot six inches more, as it has frequently done before, an immense portion of the floating part of the sewage would have been discharged on the Home Park through the open spaces left near the river, to the great nuisance and risk of disease to all residing at the time in the castle and its neighbourhood. The last time this happened was in March 1862, when the filth had to be raked off the grass and shovelled up and pushed again into the river. During flood times, when there is no true delivery of sewage either from the town, Castle, Frogmore, or any of the buildings in the Home Park, there is also great risk of dangerous effluvia being given off through the several ventilating outlets along the line of the main sewer through the park."

The consequences in dry weather are of a different kind, but almost as noxious.

"In dry weather, but especially towards the end of summer, when the river is as low as it was in 1864 and 1865, any one can understand the nuisance that must occur from the whole of the sewage and other liquid refuse of so large a population being discharged into a river with a current as slow as is the ordinary current of the Thames. There is a bend in the river immediately below the mouth of the sewer which has the effect of sweeping round all floating filth and lodging it up against the bank; people have to be constantly employed to push it with rakes from this bank into the middle of the stream. The solid parts of the sewage float and keep on the top for about three miles down the river, until they lodge up against something and there become dissolved. At the weir and locks about 900 yards below Albert Bridge, where weeds are arrested by wooden posts, there is a great accumulation of filth. In the second week of November 1864, I had to direct the removal of a putrid bed of sewage sludge five feet deep immediately opposite the mouth of the sewer, and can testify to the bed of the stream for a mile down having a thick slimy deposit and deep beds of the same material."

"When easterly winds blow in spring, and the river is low, the great mouth of the main sewer, open to the east, receives the wind, and any foul gases in the sewer are either given off and discharged into the Home Park below the castle, or else are forced back into the town. In the joint report made by Mr. Simon and Mr. Austin in 1859, the action of the wind in this manner is specially referred to as probably one of the causes of an epidemic of typhoid fever and scarlatina which prevailed in Windsor during a portion of the year 1858."

The river basin above Hampton (the pumping station of the water companies), comprises an area of about 3,676 square miles, and a population, in 1861, of nearly 900,000 persons. After making every allowance for retention in cesspools, and for villages and houses situated within the limits of the Basin, but removed from the banks of the river and its tributaries, there is no doubt that the number of persons whose sewage daily finds its way into the water from which London principally draws its supply, amounts to hundreds of thousands; and this number is destined greatly to increase, not only by the growth of population, but by the development of the sewerage system, now only in very partial operation. As the sewage travels down with the flowing water of the river, a process of oxidation goes on which tends to purification. The volume of sewage is also small as compared with the volume of the river, and upon analysis the

water pumped into London proves to contain only a very limited quantity of organic matter. But neither the one nor the other is a satisfactory ground of assurance that the metropolitan supply is wholesome. Sir B. Brodie's evidence is conclusive, that if the river be polluted with sewage at Oxford, the process of oxidation which the water more or less undergoes in its course, is no sufficient guarantee for its arriving at Hampton purged of injurious sewage taint. The London drinker of Thames water may be drinking with it some remnant of the filth of Oxford. Again, it is the general opinion of medical men, that what causes the presence of organic matter in water to be poisonous,
2151. is not its quantity, but its quality, and this special quality cannot, as yet, be detected by either microscopic or chemical analysis, and is indeed at present known only by its occasionally noxious effects.

The result seems to be that, as a water supply, the Thames, polluted with the sewage of the inhabitants of the river basin, is open in kind, if not in degree, to the same objections as well-water infiltrated by liquid from an adjoining cesspool. Well-water so tainted may appear to sight, taste, and smell to be harmless, and has been known to have been drunk for a length of time without apparent mischief, but beyond all doubt that same water is liable, under particular conditions, to become poisonous. Considering the enormous magnitude of the interests at stake in this question of the metropolitan water supply, (the health of many hundreds of thousands of persons,) it seems impos-
2151. sible to come to any other conclusion than that the only safe course is to keep sewage out of the river.

We have already shown, generally, that sewage can, without practical difficulty or serious loss, be kept out of rivers by application to land. The Thames Valley, so far from presenting special local difficulties, seems to offer a peculiarly suitable field for the initiation of the system of river purification. The neighbourhoods of Oxford, Reading, Windsor, and other provincial towns on the river afford numerous sites applicable for sewage irrigation. At Kingston and Richmond much of the surrounding district is valuable building land; but there is no reason why these towns should not combine to pump and carry their sewage to a distance where a convenient site could be purchased at moderate cost; or, failing this, to connect their sewerage by intercepting sewers with the metropolitan sewerage system, now extended to Putney.

In order to secure the river from sewage pollution, new legislative measures are necessary. At present the Thames Commissioners have no power to prevent any pollution
20 & 21 Vict. unless it is injurious to the navigation. The Conservancy Board have considerable powers
c. 147. s. 102., to prevent pollution in general, but the right of persons to let ordinary sewage flow into
27 & 28 Vict. the river is reserved.† The measures must in their character be preventive and not
c. 113. s. 74. remedial. Instead of having to wait for proof of nuisance, the authorities should have
† 20 & 21 Vict. power to stop the nuisance *in limine*, and should be responsible for the exercise of that
c. 147. s. 166. power. We would suggest a statutory provision, allowing a reasonable time for the making of new arrangements; requiring at the expiration of that time all outlets into the Thames of existing sewers to be closed; enabling the authorities, in default of the owners, to do the necessary work, and to enforce payment for the same; and forbidding, after the expiration of the same time, any sewage to be cast into the river from any town, village, or house, until it had been purified by application to land, such prohibition to be enforced by penalties to be recovered summarily.

The necessary powers should be vested in that body which exercises control over the whole river. Constant local supervision being indispensable, Boards of Health might also have concurrent authority for the same purpose, exercisable within their local limits. But it would not be advisable to commit the whole of the powers exclusively to Local Boards; as some Local Boards, up to this time, have been the chief offenders. Each town needs to be protected from the abuses of towns above it, and to be prevented from committing abuse towards towns below. The question of sewage pollution of a river is an indivisible one for the whole river basin. Attempts to keep the main stream pure will be vain so long as the tributaries are allowed to remain foul.

637–876. *Paper Mills.*—The question of the pollution of the Thames by Paper Mills is of secon-
1503–1684. dary importance to the great question of pollution by sewage, but has been specially
2201–2438. referred to in our instructions.

3172–3252.
3361–3500. The number of Paper Mills on the Thames proper is not very great, and, indeed, the most important seat of this manufacture is, as might be expected, upon the various tributaries of the river, the Colne, Kennet, &c., which afford to the paper-maker a purer water, and one more suitable for his purposes. That the Paper Mills of the Thames do, however, injure the purity of its water there can be no doubt, and we have thought it our duty to ascertain the extent of such injury, and what proportion of it, if any, is remediable, without serious obstruction to the ordinary operations of the paper-maker, or loss

of the profits of his trade. To render this matter clear, it may be well shortly to describe the processes which in the manufacture of paper give rise to such refuse products as may objectionably affect the river. The manufacture of paper, as usually carried on, consists of two principal processes: the first, that of preparing the pulp; the second, that of spreading out this pulp into sheets. The latter of these is a merely mechanical process, consisting of rolling, drying, pressing, &c., and it is only in the first part of the manufacture, that is to say, in the preparation of the pulp, that any nuisance or injury to the river can arise.

The preparation of pulp, or as it is technically called by paper-makers "half-stuff," is an operation partly chemical and partly mechanical, and varies with the nature of the raw materials employed and the quality of paper to be made. Rags of cotton or linen, sometimes nearly white, at others coloured, old ropes, and canvas bags, cotton waste, straw, &c., are the materials upon which the paper-maker has hitherto principally depended. More lately another source of fibre for paper-making has been introduced into this country; it is the Alpha or Esparto grass, growing in parts of Spain bordering on the Mediterranean, and now largely imported by Mr. Routledge.

The treatment to which these materials are subjected is sufficiently simple. The first operations to which rags are subjected are those of cutting and "dusting," the object of this latter being, as its name implies, to separate dirt and useless matter generally. Here arises the *first refuse* matter of the paper-maker.

The rags are now boiled generally by means of steam in a lye of soda, or sometimes of lime and soda, by which they are softened, and the fibres are detached from each other, the alkaline liquid dissolving out all grease, and any woollen matter that may be present. In the case of some qualities of rags this liquid becomes very thick and discoloured. Straw and Esparto grass undergo similar treatment, but for their preparation a much larger proportion of alkali is necessary, and the quantity of matters dissolved is far greater; these consist of vegetable albumen, resin, gum, fatty and colouring substances.

The alkali employed is, as before stated, usually soda, which is obtained from "soda-ash," the commercial form of carbonate of soda. The alkaline lye is prepared by boiling the "soda-ash" with quick or slaked lime; most commonly the mixture is allowed to settle, and the clear liquor is drawn off for use, but in some mills the lime and soda are put together into the boiler with the rags. The mixture of carbonate of lime and lime resulting from this process is the *second refuse* of the paper-maker.

The proportion of soda employed varies, as has been said, with the nature of the materials and the quality of paper to be made. With rags, the greater part of which are white, Mr. John Henry Stacey, of the Wolvercot mill, uses ¾ cwt. of soda-ash to the ton of rags. Mr. Routledge, who has the widest experience in the treatment of Esparto of any manufacturer of paper from that fibre, states that on the average 4 cwts. of soda-ash are necessary for each ton of raw material. 838. 2244.

When the boiling, which, (especially in the case of straw or Esparto,) occupies many hours, is concluded, the alkaline liquid is allowed to drain off, and the fibre is transferred to the "engine" to be washed. Occasionally, however, as when Esparto is under treatment, a quantity of water is thrown upon the fibre before removal from the boiler, by which a further separation of the coloured alkaline liquid is effected, and the subsequent operation of washing is expedited. The fibre is now subjected in the engine to the action of running water, with the aid of certain rollers and drums coated with wire gauze. The main object of this operation is to remove the alkali, together with the matters which it holds in solution, but it effects also changes in the mechanical condition of the fibre, which, although very important to the paper maker, have no special bearing upon the subject under consideration. The washing process occupies from three to six hours, according to circumstances, and requires a very large supply of water. It is this necessity rather than the use of water-power that still obliges the paper-maker to locate himself on the banks of streams, for although he can and does replace or supplement to a considerable extent the water-power for driving his different machinery by that of steam, he cannot dispense with a copious supply of water, and in the case of the best class of papers, of very pure water, for the important operation of washing the pulp of which the paper is made. Various statements give the volume required for washing the fibre at from 900 to 1,000 lbs. of water for each 1 lb. of paper produced; so that to make one ton of paper, nearly a quarter of a million gallons of water are necessary.

The chief difficulty of dealing with paper-mills, as affecting the purity of running streams, rests with this large volume of washing-water, but it is one which it is not altogether impossible to meet. It should be understood that the water is continually passing in and out of the engine, so that the alkaline refuse liquid is being perpetually diluted till the quantity remaining behind is infinitesimally small. The result of the process is similar to that of turning a small stream of water from a tap into a tub of muddy water. It is the *mixture* of the clean and dirty water which overflows and passes away; and although eventually the whole mud is removed, a long time and a large volume of water is consumed in its accomplishment. The *third refuse* thus consists of the alkaline waste liquor with all matters dissolved by it from the rags, straw, Esparto grass, &c., and the water from the engine, at all events during the first period.

When the washing is complete, the pulp, if intended for white, or slightly coloured paper, is bleached by means of chloride of lime. The bleaching powder employed is treated with water in vats, and the insoluble lime is allowed to settle. This sediment is the *fourth refuse* matter of the paper maker.

The clear bleach liquid is brought into contact with the paper pulp and left so for some time. This part of the process was formerly carried out in the washing engine, but now a separate and differently constructed vessel is employed. In the destruction of colouring matter by the solution of chloride of lime the bleaching agent is itself destroyed, and if proper care be taken, no excess, or no great excess, should remain to be subsequently washed out. And further, by the use of "antichlor," or hyposulphite of soda, which neutralizes the excess of chlorine, any risk of bleach passing into rivers is obviated. Still, however, the bleaching process is one which, if not carefully managed, is likely to lead to great injury to streams, especially in the destruction of fish.

The pulp has now to undergo further important mechanical treatment, which does not, however, require special notice here; and after being in some cases "sized" (a process which in no way affects the purity of the river water), is ready to be dealt with by the machine for the formation into lengths of paper.

It will be seen that there are five different points at which refuse arises from the manufacture of paper.

1. The product from the dusting process.
2. The lime refuse from the treatment of the soda to make it caustic.
3. The alkaline waste liquor.
4. The insoluble part of the bleaching powder.

To these may be added the bleach itself, if used in excess and without due caution.

The *first refuse* is valuable as manure, and there is no excuse for throwing it into the river.

The *second* is also valuable for manure, but is not readily dealt with, as it is in the state of a thick cream, more water than lime, and is consequently troublesome to cart away; it can, however, be drained in large pits, roughly constructed for the purpose, and will pay in agricultural value for the expense of so treating it. It is so treated at 3379. the Sheffield Paper Mills at Theale.

The *third refuse*, the alkaline waste liquor, is at once a source of injury the most serious and the most difficult to meet. It has been said that, with the exception of the small portion of liquid which will readily drain off, no attempt is usually made to get rid of this liquid except by the prolonged washing in the engine, which washing employs so large a portion of water, that it is practically impossible to deal with it subsequently, and it is necessarily thrown direct into the river. The remedy for this, however, seems simple; if the great bulk of the alkali and the matters which it has dissolved could be separated in a comparatively small quantity of water, there would be much less difficulty in disposing of it. An example will best illustrate this point, and at the same time exhibit the nature and extent of the pollution of rivers arising from the 2201–2438. refuse matter of Paper Mills; it is, however, only right to say that in the instance about to be given—that of the preparation of fibre from Esparto grass—a larger proportion of chemicals is required, and more refuse is passed into the river than where ordinary rags are employed. Mr. Routledge has a small paper mill at Eynsham, near Oxford. According to the evidence which he tendered to the Commissioners, Mr. Routledge uses each week 12 tons of Esparto grass (the only fibrous material employed at the mill), the product of which is six tons of white paper. To prepare this material rather more than 2½ tons of soda-ash per week are required. Mr. Routledge states that at each boiling about half a ton of Esparto is treated with two cwt. of soda-ash (previously rendered caustic by lime), dissolved in about 800 gallons of water. After the boiling has been carried on as long as need be, the liquid, which is of a dark coffee colour, is allowed to drain off, and runs direct into the mill-tail, a second quantity of hot water is run upon the material, which also is run into the river. The boiled fibre is now removed to the washing engine, and the remainder of the alkaline liquid is washed out by a quantity of water, estimated from data furnished by Mr. Routledge, at about 50,000 gallons for the half ton of grass. This wash-water also is passed into the river.

Now it is very material clearly to understand this distribution of the alkaline liquid. In the draining of the fibre and the water put upon it in the boiler, a quantity of not more than 1,600 gallons is run away for each half ton boiled, and this necessarily contains a large proportion of the alkaline liquid; in the subsequent washing 50,000 gallons or 30 times the previous volume is employed. The argument that it is difficult or impossible to deal with the bulk of the washing water has therefore no application to the first portions of alkaline liquid, the quantity of which is insignificant. It is further evident that by very slight modifications of the process the greater part of the alkaline liquor, say 90 or 95 per cent., might be removed before the general washing was commenced, and injury to the purity of the river water would, from this cause at least, be practically at an end.

The question still remains, What is to be done with the alkaline liquor after such separation from the bulk of the wash-water? Patents have been taken out for the recovery of the soda from this refuse, and there is reason to believe that it can be economically, and even profitably dealt with in this manner, at all events where coal is cheap. Mr. Routledge himself has made arrangements for the recovery of the soda at his large mills on the River Wear, but he argues, with some justice, that the difficulties would be far greater in small mills on the Thames, not only in the cost of coals, but in the first cost of apparatus and other disadvantages incidental to an operation on so small a scale as would be necessary at Eynsham. If, however, it be considered necessary to the preservation of the water of the River Thames in a state of greatest purity that this discharge of alkaline liquor, loaded with organic impurities, should cease, the question of deriving a profit from any process directed to that end is not of so much importance as whether the prohibition would lead to an expense which would seriously cripple the paper-maker's operations and injuriously affect his trade.

In the Evidence will be found calculations which tend to a belief that the greater part of the alkaline liquor of the paper-maker might, with profit upon the operation, and certainly without much if any loss, be so treated as to recover the soda, even in the smallest mills, and under the most unfavourable conditions, and thereby to relieve the river of this form of pollution.

There is still another way in which this alkaline liquid may be satisfactorily disposed of. Paper Mills are usually situated in close proximity to meadow land. The liquid alkaline refuse which is injurious to the river would, if judiciously employed, prove to be useful manure for land. From the evidence of Mr. Routledge it will be seen that for each ton of Esparto grass employed, only half a ton of paper is produced. No doubt some considerable part of this loss arises from the washing away of fine particles of fibre, but there can be no question that by far the greater portion is to be accounted for by the action of the soda, which dissolves out from the vegetable structure all matters other than woody fibre. In the small mill at Eynsham something like a ton of dry fertilizing matter, equal to at least three or four times that weight of decaying vegetable matter, is in this way daily thrown into the river. From this mill alone, therefore, some 200 to 300 tons of manuring matters might be employed in the fertilizing of the neighbouring fields, and there is no evident reason why it should not be so employed with very considerable advantage. It has already been shown that in the preparation of Esparto the greater part of the alkali requisite for treatment of each ton of material might readily be removed by from 3,000 to 4,000 gallons of water, and, pumping power being at hand in every paper mill, no great difficulty presents itself in raising this liquid diluted to any extent which might be found advisable, and distributing it on meadow land, even though at a moderate elevation above the mill premises. The same arguments apply in a lesser degree to all paper mills, no matter with what fibrous materials they deal.

The *fourth source* of refuse in paper making is the residue of the bleaching powder. Chloride of lime or "bleaching powder," when treated with water, undergoes changes which it is not necessary to describe here; it is sufficient to state that it does not all dissolve, but that a quantity of lime remains at the bottom of the vats in which the bleach is so treated, and that this lime is generally accompanied by undecomposed bleaching powder or by other similar compounds. As already stated, the solution of bleach only is employed by paper-makers, and this solid refuse remains for disposal. Paper-makers usually bury it. On no account should this refuse be allowed to be thrown into running waters, especially where the preservation of fish is an object.

The *last point* of his processes at which the paper-maker is likely to pollute the river is in an excessive or careless use of the bleach itself. Bleaching powder is, next to the fibrous matters themselves, the most expensive article of consumption in the paper makers' accounts, and in a trade where even small economies are so necessary to pecuniary success, there is, perhaps, little risk that any wasteful employment of this substance should occur. There are, however, careless and improvident members of this as of every other calling, and the strictest watch should in all cases be kept over the discharge of the water from the paper mill. Some regulations might also be enforced as to the strength and general fitness of the bleaching tanks and vats for their purposes. Cases have occurred in which the accidental bursting of a tank of bleaching material has caused the destruction of fish for miles below the mill where such casualty has taken place.

From this short and general review of the different operations of a paper mill in reference to the nature and extent of their influence in polluting rivers, it will be gathered that there is no serious difficulty in arresting and diverting from the adjacent rivers all those matters which are at present in many instances at least a source of their pollution, and although, as in almost all reforms of the kind, some little inconvenience and expense may be incurred by paper-makers, and such improvements may be protested against and resisted at first, there is good ground for believing that the manufacturers of paper will in the long run be rather benefited than injured by their enforced adoption.

With the exception of Paper Mills, there are not many factories on the main course of the Thames. These consist of a few Breweries (the most serious refuse from which is probably the water used for washing casks), and some Tanners' yards. The latter are certainly open to the charge of polluting the river, and, so far as the nature of such pollution is concerned, in a very objectionable form.

The tanning process is divisible into two stages; the 1st, that of cleansing the skin from the hair, and the 2nd, that of impregnating it with the tanning principle. The skins are steeped in a thick mixture of lime and water, so as to loosen the hair, which is then scraped off and washed in baskets in the river. The refuse liquid of the tank together with the deposited lime is also run off into the river. At a small tannery, concerning
3655–3719. which we received evidence, 20 bushels of lime were used per week in this way. Of itself this discharge of lime into the river is objectionable, but it is still more so because accompanied with other materials. Raw hides cannot but contribute to the water in which they are steeped animal substances of very offensive character. Neither is it necessary that the river should be used as the receptacle of this refuse. The quantity of water employed in the tanks of the tannery above-mentioned, in addition to that which would be adequate to wash the hair, does not exceed 1,200 gallons or about 5 tons per week. If sewers are within reach, the liquid might be run into them; but in their absence there would surely be no difficulty in distributing it over the small area of land which would be sufficient for its purification. Under any circumstances these liquids should not be allowed to flow into the river until they have been received into depositing tanks, and treated, if necessary, by chemical agents.

The refuse liquid from the tanpits themselves is not so injurious to the river. The tanning principle, whether from oak bark or other sources, is too valuable to be wasted, and the successive soaking of the skins is believed to remove the greater part from solution, whilst probably little or nothing is left in the skins after treatment with lime, which could subsequently dissolve out in the tanning process. The arrangements, however, which must be made for the disposal of the other refuse matters would be equally available for this, and there is no reason why it should be exempted from their operation.

The other special subject of our inquiry is "The effect, on the drainage of lands and "inhabited places, of obstructions to the natural flow of the river caused by mills, "weirs, locks, and other navigation works, and the best means of remedying any evils "thence arising."

Weirs.—To a certain extent, the consideration of weirs includes that of mills and locks, since it is chiefly through weirs that mills and navigation works affect the condition of the river.

A weir is an obstruction, fixed or in part moveable, placed across the river with a view to prevent the water passing on until it has attained a certain head; that height attained, the surplus water passes over the weir with (in times of ordinary flow) a more or less considerable fall to the level below.

There are several kinds of weirs on the Thames, viz.:—

(1.) Fixed weirs, otherwise called "tumbling-bays."

(2.) "Rymer-locks" fitted with moveable "tackle," called "flash-boards," "overfalls," "ground-gates," and "rymers." The object of this arrangement is, in times of the ordinary flow of the river, to maintain the water at a high level, and yet to afford a clear passage for the water in flood time, when the whole of the apparatus, rymers included, can be removed. Most mills have both a tumbling-bay and one or more rymer locks. The weirs or "wires" above Oxford are very similar to the rymer-locks, differing only in the details of the moveable tackle.

(3.) A mixed kind, part of the weir being fixed, and the remainder being fitted with moveable boards. A specimen of this kind is the weir at Teddington, which belongs to the Thames Conservancy.

The water penned at a weir may be used for several purposes, either separately or together, viz., navigation, irrigation, fisheries, mills, water supply. These various river interests—at least the important ones—may be reconciled under a good system of river economy. But in the present condition of the Thames, the interests connected with weirs are conflicting.

The interest of owners of Land on each margin of the reach above the weir is, that the water should be kept uniformly at a moderate level, neither so high as to waterlog the land, nor so low as to deprive it of moisture. The interest of the Navigation is that the water at the weir may be penned high enough to make the reach above navigable throughout, whether or not that height be suitable to the land. The interest of the owner of a Fishery is to have the right, exerciseable at his own convenience, of raising the water to the greatest head, and then depressing it to the lowest level. A weir is thus used for a fishery; the water is penned back, and is then suddenly released by the withdrawal of the moveable tackle; the consequence is that the fish running with the stream are caught in "bucks" placed in the weir. The interest of the Miller is, as a general rule, to pen the water as high as possible. A mill depending for its power upon the fall no less than upon the volume of the water, is most conveniently placed contiguous to a weir, because the weir ponds the water, and concentrates the fall in the river between it and the weir above; but in order to obtain the full advantage of this fall, the miller generally locates his mill, not at the weir, but at some little distance below it, drawing the water from above the weir by a mill-race; he is thus enabled, after using the water, to discharge it at his mill-tail on the level of the river below: whereas immediately at the foot of the weir the level of the water is abnormally raised in consequence of the shoal which tends to form there. The miller's object being to obtain as much water at as high a level as he can at his mill-head, and to secure a free outlet for it at his mill-tail, he may, as the river is at present managed, be placed in an antagonistic position to the land, to the navigation, and to his neighbours, the miller above and the miller below him. Sometimes it is a miller's interest to pen the water, although the land is being flooded or waterlogged; to draw down the water in anticipation of a flash (an artificial flood hereafter to be described), although the main channel may thereby become unnavigable; to pond his mill-head till it backs up on the tail of the mill above; to keep the water till he can use it, and then send it down, regardless whether the miller below is in circumstances to use it, or must let it run to waste.

The co-existence of these conflicting interests, the navigation, land, fisheries, and mills, makes it of the greatest importance in whose hands the weirs are placed. As the Upper Thames is at present managed, the weirs generally belong to the owners of the land, fishery, or mill immediately adjoining; they rarely belong to the Commissioners; and the owners of land liable to be flooded have not necessarily any personal control over them. This state of things can only be explained by reference to the history of the river.

Probably every ancient weir on the Thames was originally of the same character as those on the Upper Thames, and was erected by a riparian proprietor for his private purposes, that is, either for fishing or for driving a mill, such proprietor being obliged (for a small fee) to open the weir whenever boats applied to pass; for in that sense, at least, the Thames has been "navigable" time out of mind. Subsequently, 11 G. 3. c. 45. when the Navigation was established by Act of Parliament, the owners of the weirs were s. 9. not disturbed; they were left in possession, but they were bound to maintain the 24 G. 2. c. 8. weirs in repair, and were authorized to take certain tolls for the passing of boats. The ss. 2, 8, 9. condition imposed upon them was that they were to conduct their weirs according to the regulations of the Navigation Commissioners. The Commissioners were empowered at each weir to fix two marks,—one for the protection of the navigation, 24 G. 2. c. 8. ss. 8, 16, 18. the other for the protection of the land,—viz., low-water mark at the level beneath which the water was not to be drawn, high-water mark at the level above which the water was not to be penned, lest the land should be flooded. The Commissioners likewise settled by high-water mark the level of the fixed weirs. They were further empowered, from time to time, to view the weirs and see to their condition, and that the tackle was drawn at the proper time. Penalties were enacted for altering or disregarding the water mark, and provision was made for the indemnity of riparian proprietors for damages occasioned to their lands by the misconduct of owners of weirs.

Parliament subsequently gave the Commissioners power to construct pound-locks and exact tolls for the passage of boats through them; and the Commissioners availed themselves of this power to construct locks for the navigation below Oxford, but omitted to do so, except partially, for the navigation above Oxford. The construction of these pound-locks made the old rymer-locks unnecessary except as weirs, and their owners were compelled to maintain them as such under the same regulations as 11 G. 3. c. 45. s. 12. before; and they were authorized to exact for each barge, passing through the adjoining pound-lock, the same toll as would have been due had the barge passed through the rymer-lock. Thus arose a double set of tolls still in force; one to the Commissioners, another to, as they are called, "the old-lock owners."

This arrangement was not a favourable one for the landowners, as they were represented only indirectly through the Thames Commissioners, whilst the weirs were left in the adverse hands of owners of mills and fisheries.

Had the Navigation been in a proper condition, the Commissioners would have settled high-water mark with a single eye to the good of the land. But, unfortunately, in many cases the lower sill of the pound-lock was fixed at so high a level that there 617, 2608. 2767. 5482. would not have been water sufficient to float barges over it had the high-water mark at the weir below been reduced to the level most beneficial to the land. In such circumstances the Commissioners had to choose between the land and the navigation, and sacrificed the former by placing the water-mark too high, so as to cause the meadows above the weirs to be waterlogged and more liable to be flooded. This is the case, especially in the part of the river immediately near Oxford. Between Oxford and Lechlade, there are but five pound-locks, but the high-water mark is frequently set too high; possibly for the purpose of pounding the waters over shallows which have been allowed to form in the navigable channel of the reach above. The weirs between 6973–6975. Lechlade and Oxford have a high-water mark up to the level of the adjoining land and in some places over it. The weirs vary in width from 32 to 37 feet, whereas the river itself, varies in width from 50 to 70 feet. Such weirs contract the stream and cause it to pass with greatly accelerated velocity; they also pen back the water and cause floods.

High-water mark, even where adjusted at its proper level, has not been enforced. Statutory penalties for disregarding the water-mark, statutory provisions for the indem- 1716. 1717. 1554. nity of owners of lands flooded by the mismanagement of weirs, are alike nugatory. The Commissioners having ceased to exercise any control, the owners of fisheries and mills, left in possession of the weirs, have been allowed to manage them with but little, if any, interference. With such interests and such opportunities abuses were inevitable.

At weirs used for fisheries, as appears from the evidence, great damage is frequently 34. 8872. done to the land by reckless penning, and frequent interruptions are caused to the navigation by reckless drawing of the water below low-water mark, in direct contravention of the Statute (11 Geo. 3. cap. 45. sect. 10.). The worth of the fish caught at these 168. 1936–7. fisheries is insignificant. A right of so little value to the possessor, and so injurious to others, should be extinguished.

Millers are charged with many abuses. Repeated complaints have been made before the Thames Commissioners of millers drawing the water too low for the navigation; such complaints would probably have been more numerous had the river traffic been brisker. Millers are not unfrequently accused of tampering with high-water mark at their weirs; no case of the kind however has been proved to us. At Sandford weir, "the notorious 617. 1531. "block to the river," immediately below Oxford, disputes have arisen as to where the high-water mark *is*, and even what are the meaning and effect of high-water mark: affording sufficient proof of the lapse of time since that mark has been enforced at this place by authority; but we have had no evidence of high-water mark having been improperly removed or altered. But that high-water mark is frequently disregarded is a matter beyond question. Not only is the moveable tackle not drawn when the water has reached the mark, but even the level of fixed weirs is raised without authority, sometimes permanently, more often by the temporary erection of boards fastened with chains. Amongst themselves millers are in a lawless condition, waging petty wars against each other. In one instance brought before us, two millers whose mills were situated one below the other, had each, without authority, placed boards above the head 1580. of his own lasher; one had then torn down the boards of his rival, and in turn had had his boards torn down by a third person, himself also probably a miller. As long as millowners have the weirs in their hands, so long will the adjacent lands be water-logged 1719. and flooded.

A miller is sometimes unjustly accused of causing floods, probably because whilst others suffer by them, he, unless the flood is extreme, gains. But it has been already shown that even if the flood is caused by the obstruction of the miller's weir, the miller is not necessarily to blame; it may be that he is only utilizing the water ponded up for the good of the navigation. Again riparian proprietors, seeing their land water-logged, are 1759. too ready to fasten on the miller the blame which often attaches to themselves for imperfect drainage or neglect of the banks of the river. Floods also arise from causes quite independent of weirs.

If water-power mills could not work without occasioning this injury to lands, then, like fisheries at weirs, it would be better that they should cease to exist. Matters have much changed since the first mill was built on the banks of the Thames. Water power, formerly so precious, is now scarcely more than an auxiliary to steam. Trade has quitted the river for the railway, and the trader cares comparatively but little for the once-prized possession of a riparian site. Every year the land adjacent to a mill gains in value, and it is now easy for a mill to do injury to lands to the amount of several times its own value. Had wise counsels and true economy prevailed, the mill at Sand- 1461–1464. ford would long ago have been purchased by the neighbouring riparian proprietors or by the city of Oxford.

With regard to the rights of millers to the use of the water, there seems to be some ambiguity in the Thames Navigation Acts. By the 11th Section of 11 G. 3. c. 45, the Commissioners are required so to construct such locks and weirs, as they were authorized to construct, that "a sufficient head of water may be constantly pounded and kept "up for the purpose of working the mills," &c. On the other hand by the 9th section of the same Act the owner of any private weir is prohibited from drawing down water below low-water mark, and from penning it above high-water mark. Nor are these marks permanently fixed. It is the duty of the Commissioners to re-adjust them, if necessary. Supposing, then, high-water mark to be duly lowered, and the due observance of it and of low-water mark to be enforced, the miller might suffer, but he would have no wrong to complain of; he would still be left in possession of his only legitimate right of using the water between high and low- water marks. Whatever be the proper interpretation of the Statute, it is clear that the right of the miller should be so limited. A right so limited would still be of value, and no one could be injured by the exercise of it. If the water is pounded for the sake of the navigation there is no reason why it should not be utilized by the miller. In any restoration of the river, therefore, mills need not be removed provided they are regulated.

Weirs indirectly the cause of Land Flooding.—A weir may be the indirect cause of flooding by its action on the channel above or on the channel below. Ordinarily, a weir, from the mere fact of its being an obstruction, tends to cause a deposit in the river above it. The water comes down, more or less charged with silt, impinges against the weir, is impeded, and for a short distance immediately above the weir becomes in many cases a pond, and then the silt from its gravity sinks to the bottom. This silting up is primarily a hindrance to the navigation; but of course as far as it reduces the sectional area of the channel, so far does it increase the liability to floods. One obvious remedy is to remove the deposit by artificial means, namely, dredging. The Commissioners have long neglected to dredge. In the upper district there has been but little dredging 1985-86. for many years, and the consequence is that the channel is in many parts silted up.

A weir may indirectly cause flooding by deranging the channel below. The water falling down from the height of the weir by degrees scoops out, immediately at its foot, a deep hollow; the material is carried a little farther down the stream, and accumulates as a bar across the channel. The stream must either rise and pass over this bar or force for itself a passage round it. If the stream rises and passes over the bar, it will on the other side scoop out another hollow with another hill beyond, and the process will go on until in time a succession of deeps and shallows is formed. If, on the other hand, the water forces a passage round the bar, it acquires a zig-zag motion which it retains; the navigable channel shifts from side to side of the river, and the stream makes land on one bank and wastes it on the other. The irregularity thus produced in the bed and banks inevitably increases the liability to floods. This effect upon the channel below is discernible at nearly every weir upon that part of the Thames which is under the control of the Commissioners. The weirs ought to be constructed with steps or a lengthened apron so as to break the fall of the water from the higher to the lower level.

Effect of Weirs on Land Drainage.—A weir being an obstacle to the free flow of the river, is an impediment to land-drainage, if, as is still generally the case in the Thames Valley, the drains pass directly from the lands into the river above the weir. 8725–26. But it would be otherwise under an improved system of land-drainage. The proper method of draining a river valley, according to the opinions of the best qualified persons, is to divide the valley into a series of districts following the course of the river downwards, and to carry the drains of each district into the next district below, so as to give them an outfall into the river at a lower level. Under such a system weirs properly constructed would not interfere with drainage, nor in the aggregate would there be any loss in water-power to the river. But the river must be dealt with as a whole, else one district might be receiving the water from above without a corresponding right to discharge into the district below, which unfortunate result sometimes happens under the partial operation of the existing Land Drainage Act. The body exercising authority over the Thames should be armed with the powers of Drainage Commissioners.

What we would suggest with respect to weirs is, that the property in all the weirs on the Thames, now vested in private owners, and the liability to maintain the same weirs, should be transferred to the body which has the government of the river. Each case will require separate treatment, and it may be left to subsequent inquiry to ascertain to what extent the interest of the land requires high-water mark to be lowered; what change in the navigation locks, or what dredging of the channel such lowering will involve; whether the weir is of the proper dimensions and construction; and what provision is necessary to prevent or remedy any irregularity of the channel which may be produced by the action of the weirs. The test of whether a flood is due to the obstruction of the weir is whether or not there is at the time of the flood any difference between the level of the water above the weir and the level of the water immediately below it. If the water has risen so high below that the usual fall has disappeared and the water flows evenly over the weir before the lands above are flooded, then, whatever the mischief to the meadows above from any subsequent increase of the flood, it is not caused by the weir, for the weir has ceased to operate, and the channel below the weir cannot carry off the water more rapidly than the water passes over the weir; but if whilst the land on the upper side of the weir is being flooded the water drops over the weir to a lower level, then it is clear the water is being unduly penned by the weir. At Sandford Weir, even in extreme floods, there is always a fall, proving that flooding at Oxford may be partially prevented.

In the Appendix will be found a diagram exhibiting the construction and action of weirs such as have been employed with success on the River Severn.

Floods in the Valley of the Thames may be distinguished as—
Ordinary floods preventible by common care; and
Extraordinary floods, requiring special means of protection.

Ordinary floods are caused by—

1. Obstruction of the water by weirs, as already described.
2. Neglect of channel and silting up of the river.
3. Flashes.

Floods occasioned by neglect of Channel.—Every river bed left to itself is irregular, the bed silting up and the banks falling away. Silt is brought down by the current and settles here and there in the channel; weeds grow up and arrest more silt, and in time the silt grows more weeds, and so the accumulation goes on, until in course of time there is a serious obstacle. The effect of such an obstacle is the same as that (already described) of a bar collecting at the foot of a weir. The uniform depth of the river is deranged into a series of shoals and hollows, the current is distorted, and the banks disordered. In some cases the obstacle constitutes a block of the whole channel, and the river has then to force for itself a new channel, breaking down banks, and laying waste lands in its course. In some places the entire bed of the river gradually rises in 370. level, loses capacity and delivering power; drainage is checked, lands become waterlogged, and floodings are more frequent and more extensive.

This natural tendency of the river to spoil itself needs to be artificially counteracted. If mischief is to be prevented, a channel must be maintained. The banks must be secured, and the bed systematically dredged. Dredging increases not only the sectional area of the channel, but also the mean hydraulic depth of the water, and therefore, in two ways, expedites the discharge of flood-waters.

The channel of the Upper Thames is now neglected. The Thames Commissioners
have no power to maintain the banks, except for the purpose of the Navigation; and
apparently they are satisfied so long as they have a tow-path. If the tow-path be
carried away by a flood, a new one is made farther inland; at one place this has occurred 1183.
thrice in the memory of a man still living. Nor are riparian proprietors, to whom the 4422–4434.
banks belong, at much pains for their preservation. The case of the Crown property at
Windsor, where the banks have been made secure by Mr. Ingram, is one of few ex- 3980.
ceptions. The Commissioners have full powers to dredge for the benefit of the Navigation. 8599.
But with the decay of traffic, these powers, which had never been actively exercised, 24 G. 2. c. 8.
have fallen into complete disuse, and un-authorized and un-regulated dredging for s. 19.
ballast goes on without let or hindrance. Riparian landowners appear to acquiesce in 3971.
the deterioration of their property; of late years, however, some attention has begun to
be paid to draining and embanking. 130. 131.

This neglect produces its consequences, such as may be seen more or less throughout 1469.
the course of the Upper Thames above Oxford. At Port Meadow, situated on the Isis, 318.
immediately above Oxford, and specially adapted for the recreation of the citizens
and members of the University, the bed of the river opposite had silted up, and 20
acres of what was once grass land were in a state of devastation, and for many months
in the year the whole meadow was a swamp. This state of things has recently been
much alleviated by the praiseworthy exertions of the Rev. Dr. Greswell.

Floods from Flashes.—A flash is an artificial flood made for the purpose of floating barges over shoals in the navigable channel. Flashes, therefore, are only necessary from defects in the navigation.

The process is as follows:—The water is penned at a weir or "wire" in one of the
upper reaches of the river above Oxford: the body of water thus accumulated is then let 1830–1846.
down by opening the weir, and is passed on from reach to reach, the barges riding on
the crest of the wave. Without these flashes the navigation cannot be conducted,
even below Oxford. Flashes or freshes of water are recognized as legitimate by
28 Geo. 3. c. 51. s. 18., which empowers the Commissioners to make regulations for
their being given at all such times as the Commissioners shall think necessary for the
better carrying-on of the navigation. The Commissioners by their byelaws prescribe that
there shall be two such flashes per week; but besides these, it appears that any person
can go at any time to the upper reaches and purchase a flash for a few shillings; and
the money so paid belongs to the owner of the weir, and does not go to the revenues
of the Commissioners. The flash often rises so high as to flood the land. Mr. Alderman
Ward states that the flashes formerly brought down from Lechlade to Oxford flooded the
country, even whilst the hay was on the meadows. Thus for a few shillings damage was 940–942.
done to the extent of many pounds.

The system of flashes is a mere makeshift. The navigation thereby benefited
is at best intermittent, and only in one direction, viz., down the stream. The
navigation is also uncertain. Many a flash that has been bought and paid for by the 1556.
bargeman is lost to him by the miller refusing to pass it; in which case barge, barge-
men, and cargo may be detained in the midst of their voyage for two or three days till
the next flash comes. For this conduct of the miller the law practically gives no redress. 1720.
The navigation is also dangerous; boats carried down by this irregular flood are in a
shallow channel apt to get stranded on shoals.

The system of flashes is also injurious to the millowners. It renders the water-supply 683.
intermittent instead of regular, and in order to use the flash when it comes to him, the
millowner must have extra machinery. Even with extra machinery he often cannot,
lawfully at least, utilize the whole of the flash, for as soon as the water reaches high-
water mark he must let it go to waste, otherwise he detains it to the injury of the land. 1617.
Flashes are often the subject of dispute between millowners. A flash may be detained at
one mill until it back up against the tail of the mill next above.

Extraordinary Floods.—Besides ordinary floods, which are preventible by ordinary precautions, attention to weirs, attention to the bed and banks of the river, the Thames Valley is liable to heavy floods, altogether beyond the reach of such measures.

The flood volume of the Thames, as compared with the volume of the ordinary flow, shows a very moderate increase compared with that which takes place in other rivers, still it is far in excess of what the channel is capable of carrying off. Such floods

spread over the valley on either side, and inundate low suburbs of towns on the banks, as at Oxford, Eton, and other places. The consequences are serious with regard to pasture land. If, indeed, a flood occurs in the winter, and if it passes quickly over and then subsides, leaving its deposit of silt, the effect is good and not harm to the herbage; but, if the water remains on the land longer than three or four days, mischief is sure to show itself in the growth of coarse rushy grass. In the Thames Valley flood waters are
2107. sometimes out in winter for weeks together. In summer (and extreme floods do occasionally occur in summer), floods are most injurious, spoiling the crops, and sometimes even sweeping them bodily away. The hay thus swept off, unless immediately intercepted by the owner, floats down the stream beyond the limits of the estate, either to be lost altogether, or to be raked off the surface by some riparian landowner below, who, willing to trade upon the misfortune of his neighbour, appropriates it as waifs and strays. That these waifs and strays are not inconsiderable may be judged from one instance brought before us, in which the hay amassed by the river scraping of a single individual, himself possessing no hay land whatever, made up a rick which at public auction
8873. fetched 37*l*. The depreciation in annual value of each acre of pasture-land caused by liability to floods is estimated by different witnesses at sums varying from 10*s*. to 20*s*., and even more. It is unnecessary to describe the discomfort experienced, whilst the floods are out, by residents in the valley, some being kept prisoners to their houses, others having the water above the floors of their houses; their health also suffers; when
2108. the waters retire, an effluvium invariably is perceptible through the valley; the waterlogged surface exhales mist and vapours; the temperature of the atmosphere of the valley is reduced, and if actual malaria is not generated the spirits and general health of the inhabitants are affected.

Such floods occur every year. The condition of the valley of the Thames this winter has been disgraceful. Thousands of acres of land, with many roads and footpaths, vast areas of urban lands, and even streets, have been for several weeks under water; lands have been damaged, local traffic has been interrupted, and human health lowered. An estimate of the inconveniences and losses by this state of things during this winter, 1865-66, if fairly and fully made in money, would show that the construction of the works necessary to control these evils, would be true economy.

Partial relief of these extreme floods may be obtained by dredging, to increase the capacity and delivering power of the river as an arterial drain. In this way the reach below Sunbury lock has been made to pass floods of the same size as those which, before the dredging operations, used to inundate the adjoining meadows. In the same way dredging has been successfully employed on the Severn. The great bulk of the water constituting extreme floods cannot be contained in reservoirs; it cannot be stopped in its course; and when it comes the object is, to deal with it so that it may occasion a minimum amount of mischief. It is necessary for this purpose to provide a larger channel by means of artificial embankments. These embankments should be constructed in connexion with irrigation, and also with arterial drainage. River-water irrigation has not been practised on any great scale in Great Britain. The fall of rain has been too continuous and too copious, and the days of unclouded sunshine too few to have encouraged this form of agriculture. But that irrigation would be beneficial is unquestionable. It would be a great mistake therefore to construct the embankments so as to shut out the water altogether. Irrigation might be provided for, both by natural and artificial means: by natural means in admitting flood water when the river rises to a sufficient elevation; by artificial means in the use of water power to pump water.

Then as to drainage; if the system be carried out of dividing the valley into a series of districts, and draining each district through the next district on the lower level to the river, the main drains would run at the back of the embankments, and the embankments would serve to cut off the communication of the drains with the river. In short, what is required is river embankments, with main drains, flood gates, and sluices, to enable riparian proprietors to shut out, admit, restrain, retain, or pass off the flood of the river at will. But such embankments must be systematically constructed under some general supervision. Partial embankments have already been here and there carried out by individuals to their own advantage, as the evidence shows, but in some instances to the
7391. injury of their neighbours. The embankment on one side of the river may throw the water more out on the other. Embankments on both margins in one district may back up the water on the district above and precipitate it violently on the district below. These embankments and drainage works should, in our opinion, be carried out and afterwards be superintended by the body having the government of the whole river, which body should, for the purpose, be invested with all necessary powers; amongst others,

power to levy a tax for the construction and maintenance of the works upon the land falling within the limit of their beneficial operation.

Mills.—The effect of mills upon the condition of rivers is chiefly by the use of the weirs to which they are attached. The operation of those weirs has been already described. For the rest, millowners do to the stream little of either good or harm. For a few hundred yards they more or less cleanse the bed, and more or less maintain the banks. As to the weeds which come floating down and threaten to entangle their wheel, these 692–695. they let loose to float down to the mill below.

Navigation Works.—The Lower Navigation under the Thames Conservancy Board is generally successful, and calls for no remark except as to the condition of the river in the neighbourhood of Richmond, which has been affected by the improvements which have taken place below it. The removal of old London Bridge lowered the water as would the removal of a weir. Of later years, under the active management of the Corporation and Conservancy, steam dredgers have been constantly at work, removing impediments in the bed of the river from London Bridge upwards towards Putney, and thereby sharpening the inclination of the surface of the water from Teddington downwards. The result is that the stream now runs down more rapidly from Teddington, and tends to leave the upper part comparatively dry. It appears according to a plan exhibited to us that the level of extreme low-water at Richmond Bridge has sunk 8952. 3 feet since the construction of that bridge. Some would account for this by an alleged diminution of the river water above Teddington Lock, which diminution they would attri- 6674. bute to the abstraction of water by the water companies, to enlarged drainage operations in the upper districts, and to the late remarkably dry seasons. But all these causes combined are inadequate to produce such a lowering of the water. We are convinced, especially by the evidence of Mr. Leach, that the lowering of the river is to be attributed, not so much to loss of water above, as to the removal of old London Bridge and also to the improvement of the channel below. The consequences to the district in the neighbourhood of Richmond are serious; that part of the river is deteriorated for purposes both of trade and pleasure. The navigation between Putney and Richmond was always a tidal one, but the period during which barges can pass and repass is now still further 6634. reduced. The channel, available for boating purposes, is considerably curtailed. Residences on the river's edge, once constantly accessible by water, are now at low tide 6350, 6351. cut off from the stream by an unsightly interval of offensive mud. Nuisance from sewage is greatly augmented. Not only is the stream more fouled by the volume of sewage thrown into the river having, from growth of population and development of sewerage works, greatly increased; but the banks on either side are, to a larger extent, 6361. laid bare, and covered with sewage deposit. Possible remedies have been made the subject of discussion. One remedy proposed has been the erection of a weir and lock at Isleworth. This, it is said, would provide sufficient water for covering the foreshore, and the maintenance of the navigation. Fears, however, have been expressed that a weir which would shut out from the river a large portion of the tidal water, would diminish the scour and so be injurious to the navigation below. On the other hand it is said that a similar weir at Tewkesbury, erected considerably below the limits of the tidal action of the Severn, has not been found to be mischievous, and that the volume of tidal water in the Thames would bear reduction, because it has lately been augmented by the removal of old London Bridge and other obstacles in the channel, and because the scour will be improved by the embankments now in course of construction.

To decide between these two opinions we feel is beyond our province; the establishment of a tidal lock and weir, though no doubt a grave matter, is one that may safely be left in the hands of the Conservancy and their Engineer. The inhabitants of the Richmond district have suffered from the improvements effected by the Conservancy in the channel below, and therefore have a strong claim on the consideration of that body.

A well-regulated navigation would be a benefit to both the river and the land; the weirs would maintain the reaches, without flooding or water-logging the land; continual passing of barges prevents the growth of weeds, and keeps open a water-way for floods; systematic dredging and maintenance of banks, such as are indispensible to secure the navigation, equally improve the river channel as an arterial drain, or as a conduit of water supply. Few, however of these merits can be claimed by the navigation of the Upper Thames. It has been already shown, that the defects in the navigation render it necessary to pen the water of weirs at a height injurious to the land, and to let down artificial floods called flashes, which occasionally do great damage. Dredging and bank making are operations almost unknown. Above Oxford the navigation works (most of them of a rude and antiquated character, not pound locks) are in utter decay; the channel is unnavigable, and traffic may be said to have ceased. Below Oxford the navigation is still maintained, but only by the pernicious makeshift of flashes. The pound-locks are out of repair, ineffectual, and insecure. Such of the weirs as belong to 5464. the Commissioners are in course of dilapidation.

The Commissioners are unable to improve the existing state of the navigation. As a body they are insolvent. They have a bonded debt amounting to 88,400*l.* upon the security of their tolls, and no interest has been paid for several years. The income from the navigation has been unequal to the amount requisite to be expended upon the works, even to keep them in their present makeshift condition. If, therefore, this navigation is to be saved, the immediate intervention of Parliament is indispensable.

Whether the navigation of the Upper Thames, or any part of it, can ever be made profitable as a commercial undertaking, is a question on which we would express no opinion. If the navigation is to live against the competition of railways, it will only be after it has been placed in thoroughly-good working order. Hitherto it has never had a fair chance. In addition to liability to interruption from frost, flood, and drought, defects which it shares in common with all other river navigations, the Upper Thames navigation has had to contend with impediments peculiarly its own; a multitude of governors, heterogeneous, unpaid, unqualified, and without capital; tolls excessive, arbitrary, and never systematized into through-rates; an intermittent supply of water by flashes; banks and bed of the river utterly neglected; locks never well constructed, and now crazy or dilapidated. That traffic should, under such a system, exist upon the river, in the face of railway competition, is a thing utterly impossible. One witness, a paper manufacturer, carrying on a large trade on the Kennet, just above Reading, informed us that his firm was prevented from using the navigation by the uncertainty of its traffic, although even at existing rates the use of the navigation, instead of the railway, would 3394. save them 250*l.* per annum.

But even if not directly profitable, there are reasons why no portion of the existing navigation should be suffered to come to an end. The Thames is an ancient highway, and neither roads nor railways can supply the place of the navigation as a means of mutual communication between the towns and villages on the banks, or as the most convenient mode of transport for heavy goods. Consideration for riparian proprietors forbids the abandonment of the weirs into the hands of the mill-owners without control. The navigation, if rightly conducted, is in harmony with all other interests connected with the river. Mills, towns, meadows, water-supply, the picturesqueness of the whole valley, all will gain by the maintenance of a proper navigable channel. We think, therefore, that on other grounds, even if not on the ground of commerce, the navigation of the Upper Thames should be restored, or rather for the first time placed in proper order.

As the first step to a restoration of the river, we think that the Thames Commissioners should be superseded as the governing body. The constitution of that body is unfitted for the work it has to do. Of the 600 or 700 persons who are nominally Commissioners, many have never taken the trouble to qualify by subscribing the necessary 1393. oath. Of the remainder, the great majority pay no attention to business. Great difficulty is found in procuring members to act upon the District Committees, and even to come together for the purpose of electing members for such District Committees. One gentle-1394. man in his own person fulfils the triple office of Commissioner, committee-man, and clerk of a district. The general meeting of the whole body of Commissioners usually consists of the same members (with some few additions) as have attended the committee meeting, which is fixed to take place immediately before. On occasions when an appointment 575–577. has to be made to any office, the friends of the candidates may beat up their respective supporters, and thus mere numbers may overrule the few who are qualified to have an opinion by reason of having taken an active part in the business of the navigation. The Commissioners are not a corporation, and members present at a meeting 587. where works are ordered are (in default of general funds) personally liable for the cost of works so ordered. The powers vested in the Commissioners are restricted to those which are absolutely necessary for the navigation, and are quite inadequate for a body having the charge of a great river. They have no right to improve the bed by ballasting 24 G. 2. c. 8. s. 19. the silt or clearing away weeds, except such work is required for the navigation. They have no power to aid in land drainage, to protect the river from pollution, to make artificial embankments, or even to secure the banks. Their Acts of Parliament are 1717–1720. ambiguous and impracticable.

3878. In our opinion it is necessary that the government of the whole river should be consolidated. Many measures, such as land drainage, embanking, prevention of pollution are each urgently needed, yet cannot be partially dealt with. They concern the whole river, and require to be carried out under authority according to a system which shall obtain continuously throughout the valley. Again, the various interests connected with the river, navigation, land, mills, water-supply, can be harmoniously developed, but only by the whole of the river being placed under one management. This we consider may be accomplished by placing the Thames under the jurisdiction of the Thames Conservancy with full powers. 8726–27.

The right of the old-lock owners to take tolls should cease, as also their liability to maintain the weirs; such an arrangement would enable the governing body to establish a reduced tariff and through-rates. The existing bondholders might receive, as compensation, the market value of their bonds, or, at their option, might have their bonds postponed to an issue of preferential bonds. The funds for the restoration of the Upper Thames might be raised upon the security of the profits of the Upper Navigation, and if necessary, the tolls of the Lower Navigation might be given as a collateral security. But we would suggest as an additional means for the reinforcement of the profits of the Upper Navigation a rent-charge upon Waterworks drawing their water-supply from the Thames.

Five Metropolitan Water Companies are authorized to abstract, daily, from the Thames a volume of water which may exceed one-fifth of the minimum flow of the river, though the volume actually abstracted in any one year has only been about half the quantity. Each of the companies pays to the Conservancy an annual sum of 300*l.* (except the Lambeth Waterworks Company, which having paid a premium of 1,000*l.*, now pays annually only 200*l.*); but these payments are not for the right of abstracting water, but as compensation for expenses incurred by the Conservancy in consequence of the works of the Companies. For the water itself nothing is paid. Nevertheless the Water Companies are considerably indebted to the Navigation Works. 5429. 8396.

The maintenance of a proper navigation throughout the entire course of the river would greatly contribute to the purity of the water, the growth of weeds, which, by their autumnal decay, yearly add to the pollution of the river, would be prevented. The water undergoes aeration in its fall over the weirs, and clarifies itself in its passage through the reaches, which (especially in summer) serve as a series of "settling ponds." In the proportion that the river-channel is improved for navigation by being kept deep, and systematically dredged, and with banks well defined, does it approximate to the perfection of an artificial conduit. Still more would the Water Companies profit from measures to prevent the pollution of the Thames. The river instead of being, as at present, throughout the length of its course the receptacle of every sort of impurity, would be saved from town sewage and manufactory refuse, subjected to systematic scavenging, and jealously guarded from all pollution; the Water Companies will then be able to supply their customers with purer and more wholesome water. That, under these circumstances, metropolitan and other Water Companies abstracting water from the Thames should be called upon to contribute to the cost of maintenance of the river, seems to us not unreasonable. We would add that the imposition of such a rent-charge would be no novel burden for Water Companies to bear. An annual sum of 1,500*l.* is paid by the New River Company, and of 2,000*l.* by the East London Waterworks Company to the Trustees of the River Lee. 5464–5470.

In conclusion, we would respectfully draw attention to the fact that this Report does not deal with the tributaries of the Thames. This omission does not invalidate any of our suggestions, and under the circumstances was unavoidable. Had the delivery of our Report been postponed till the inquiry into the state of the tributaries had been completed, it would have been too late to be of service in any scheme providing for the immediate necessities of the Upper Navigation. For the same reason the question of Water Supply and Storage Reservoirs has been left for subsequent consideration.

CONCLUSIONS.

We now beg most humbly to lay before Your Majesty the main conclusions to which we have been led by our inquiry.

That the Navigation works on the Upper Thames are in a neglected and ruinous condition, and that some of the weirs and locks are dangerous.

That some Weirs pound the water at too great a head, and thereby permanently water-log adjoining lands and the suburbs of some cities and towns, as Oxford, Eton, and Windsor.

That the existing method of working the navigation by "Flashes" is antiquated, rude, and destructive to the channel and banks of the river, and, at times, to the crops and produce on adjoining meadow and other lands.

That fishing, ballasting, osier-growing, and weed-cutting are not exercised with due care for the even flow of the river water and the safe maintenance of the navigation.

That there is no systematic forming and maintaining of the banks, islands, and aits.

That some portions of the river have been privately embanked so as to prevent flooding of adjoining lands. But that, for the greater part of the distance between Cricklade and Kingston, the land is liable to extensive and injurious flooding.

That Sewage from towns, villages, and houses on the banks of the river pollutes the water.

That the River is fouled by refuse from Paper Mills and Tanneries, as also by floating carcases of animals.

That there are many shoals and some mud-banks in the river consequent on the incompetence of the Thames Commissioners to maintain it in a navigable and proper state.

That the several Acts of Parliament regulating the Upper Navigation have been proved to be inefficient for their intended purposes, and inconsistent with each other.

That the available income from all sources at the command of the Thames Commissioners has for some time back not been sufficient to meet current expenses.

That the Thames Commission, as now constituted, is far too numerous for efficient working.

That from experiments conducted under the Sewage Commissioners, and evidence taken on the subject of sewage utilization, and also from our own inspections and investigations, and from the evidence appended to this report, we believe that town and house sewage may be so utilized on land as to preserve the river from the danger of pollution.

RECOMMENDATIONS.

We also humbly submit the following Recommendations to Your Majesty :—

That the whole river be placed under the superintendence of one governing body.

That this body be the existing Conservancy Board, provided that the Board receive an addition of an adequate number of representatives of the local interests of the Upper Thames ; and such representatives to be elected by the persons who now constitute the Thames Commissioners.

That, after the lapse of a period to be allowed for the alteration of existing arrangements, it be made unlawful for any Sewage, unless the same has been passed over land so as to become purified, or for any injurious refuse from Paper-mills, Tanneries, and other works, to be cast into the Thames between Cricklade and the commencement of the Metropolitan sewerage system, and that any person offending in this respect be made liable to penalties to be recovered summarily.

That it be made incumbent upon the Conservators to see to the enforcement of the above prohibitions against pollution of the river, and that for this purpose power be given to them to visit and inspect works and, after due notice, to close the outlets of sewers, drains, and discharge-pipes into the river within the limits described in the last preceding recommendation.

That, subject to proper safeguards to prevent abuse, powers be given to local authorities to take land compulsorily for the purpose of sewage irrigation, to an extent not exceeding one acre for every 50 persons whose sewage is to be applied.

That the Upper Navigation from Lechlade to Staines be put into good working order, and so maintained.

That the rights of private persons to take tolls at locks no longer used for the navigation be abolished, and that the property in all weirs on the Thames now belonging to private persons, together with the liability to maintain the same weirs, be transferred to the Conservators.

That all fishing-rights which interfere with the level or free flow of the river be abolished, with such compensation as may be settled by Parliament.

That the Conservators be empowered to levy upon all Waterworks, taking water for domestic or trade purposes from the River Thames, a rental in proportion to the volume abstracted; the maximum of such rental to be named by Parliament.

That the Conservators be empowered to borrow the necessary money for the restoration and maintenance of the Upper Thames. That in order to provide adequate security for money so to be borrowed, the Conservators be authorized to give a first charge upon the future revenue of the Upper Navigation to the postponement of the existing bonds, and to pledge, as collateral securities, the rental above mentioned upon the Waterworks and also the revenue of the Lower Navigation.

That upon the aforesaid security the Public Works Loan Commissioners be authorized to make advances to the Conservators.

That powers be given to the Conservators to compound with the holders of existing bonds on the Upper Navigation.

That powers be given to the Conservators to make Embankments throughout the valley of the Thames, and carry out arterial drainage operations, the cost of such improvements to be met by a tax upon the properties so improved.

All which we humbly certify to Your Majesty, under our hands and seals.

(Signed) ROBERT RAWLINSON. (L.S.)
JOHN THORNHILL HARRISON. (L.S.)
J. THOMAS WAY. (L.S.)

GODFREY LUSHINGTON,
Secretary.

March 29, 1866.

ADDITIONAL RECOMMENDATION BY MR. HARRISON.

[*In this Recommendation Mr. Rawlinson and Professor Way do not concur.*]

I consider that in legislating for the Thames it is of the utmost importance that the financial provisions, both for the restoration and the subsequent maintenance of the river, should be ample and from unquestionable sources. One principal cause of the failure of the Thames Commissioners is, that Parliament, whilst imposing upon them a duty, omitted to give them power to raise money, except upon the security of the tolls; the tolls failing, the navigation inevitably fell into decay. Proper financial provision will be the more necessary if effect be given to the recommendation that "the property "in all weirs on the Thames now belonging to private persons, together with the liability "to maintain the same, be transferred to the Conservators." It is only just to the millers, that if their weirs be taken out of their hands, there should be some security that the water power for their mills should not be extinguished. It would not be just to impose upon the water companies a disproportionately heavy tax. But unless the Conservators have ample funds at their disposal, the Upper Navigation will not be properly restored, or if restored will relapse into decay. The Conservators have at best a limited interest in the Upper Navigation, and it is important that their activity should not be retarded by any fear of hampering the Lower Navigation with an excessive debt. The chief interest in the maintenance of the upper navigation is that of the towns and lands on the banks of the river. The full use, profit, and enjoyment of the river, of which communities and individuals are now deprived by neglect, and which are unattainable by merely local efforts, would be secured by an effective general superintendence. Sewage and other refuse would be excluded, and towns and villages now suffering, or liable to suffer, would be protected from the abuse of those situated above them on the river. The convenience of river traffic would be renewed. The long deep reaches, so essential a charm to the great towns and to the residential properties on the banks, would be carefully maintained. Riparian estates would suffer less from floods and be permanently improved. I would, therefore, recommend that the collateral security authorized to be given by the Conservators should include a tax upon houses and lands within a few miles of either margin of the Upper Thames; the local limits of such tax and the maximum rate to be levied in any one year, to be settled by Parliament. Such a tax would fall very lightly, and would constitute an ample security, and the supervision of the taxpayers over the appropriation of their money would be the best guarantee that the Conservators should do their duty, viz., restore and permanently maintain the Upper Navigation.

(Signed) JOHN THORNHILL HARRISON.

APPENDIX.

APPENDIX No. 1.

Extract of a Letter from the Rev. J. C. Clutterbuck, M.A., to John Thornhill Harrison, Esq., C.E.

Vicarage, Long Wittenham, Abingdon,
Nov. 25, 1865.

Dear Sir,

I send send you a copy of an essay on Berks agriculture, in which the ground ice question is shortly stated: "The formation of ice at the bottom of the stream is "another cause of obstruction. The ground ice, when it "rises under the influence of the sun, lifts the stones and "gravel to the surface; these masses float down the stream "till they lodge in certain localities, and increase the "natural obstructions. This ice does not usually form "except under a temperature below 20°, as in January "1857 and December 1859." Subsequent observation has confirmed the statement, that it requires a temperature of 12 degrees of frost, and this usually two consecutive nights.

It has been found that the whole body of water is 32½ deg. at the time when tested.

The ice when seen at the bottom has the appearance of masses of half-melted snow, and is formed at the tail of weeds, around stones, which it lifts to the surface when it rises about sunrise, or usually soon after.

When examined the mass consists of lamina and spicula of ice, attached to each other at various angles, as though the formation progressed as new eddies are created by the forming of these lamina. I do not state this as an ascertained fact, though the appearance and position of the ice favours the idea.

I have seen pieces of rock 8 pounds weight raised by a mass from the bottom and carried down the river.

The formation prevails in the sharp running shallows, and is *said* not to take place under bridges, &c., nor below the junction of the Thames and the so-called Isis near Dorchester, where the river runs over the upper green sand in which there are springs.

The shifting of gravel and its deposit, especially below weirs through which the ice is carried, is very great; the whole surface of the river is sometimes nearly covered with the floating masses, most of them carrying down sand and stones, and, of course, depositing them where the ice lodges or is broken up at weirs, &c.

I am told that the ice forms at the sides of open sluices, which it gradually *fills up*, and around the posts, &c. Every obstruction causes an eddy, and in these eddies the ice forms. There are other theories into which the element of friction enters; there is, I conceive, friction in every eddy.

* * * * * * * *

Yours, &c.
(Signed) J. C. Clutterbuck.

J. T. Harrison, Esq.

APPENDIX No. 2.

Letter from the Secretary of the Rivers Commission to the Secretaries of each of the following Water Companies: Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, South Essex, and West Middlesex.

Rivers Commission,
2 Victoria Street, Westminster, S.W.,
December 20, 1865.

Sir,

I beg to send you a copy of the Rivers Commission, and of a letter from the Home Office especially instructing the Commissioners to consider the question of water supply.

The Commissioners will be much obliged if, at your earliest convenience, you will supply them with a copy of the Special Act or Acts constituting your company, and also information on the following particulars:

(1.) The horse-power of the engine of the waterworks of your company.

(2.) The maximum quantity of water, in gallons, authorized to be pumped or abstracted by your company from the Thames or tributaries thereof.

(3.) The various purposes for which the water so pumped or abstracted is authorized to be applied, as household service, street service, manufacturers, railways, canals, &c.; the maximum volume authorized to be applied in a year for each of these purposes, with a reference to the particular section of the Act conferring the authority.

(4.) The total volume of water, in gallons, actually pumped or abstracted by your company from the Thames or tributaries thereof during the year 1865, with a specification of the quantities applied for each of the several purposes.

(5.) The number of houses and population supplied by your waterworks.

(6.) The rentcharge, if any, and to whom paid.

I am, &c.
(Signed) Godfrey Lushington,
Secretary.

APPENDIX No. 3.

Letter from the Secretary of th South Essex Waterworks Company to the Secretary of the Rivers Commission.

South Essex Waterworks Company,
21 Gresham Street, Old Jewry,
London, Dec. 27, 1865.

Sir,

In reply to your letter of the 20th inst., requesting me to forward you one of the Special Acts of this company, I forward you the only one that has been passed. In answer to your six questions, I beg to say—

(1.) The engine-power of the company is 60-horse.

(2.) That it does not abstract any water from the Thames.

(3.) Answered by No. 2.

(4.) Ditto.

(5.) The number of houses supplied by this company is 550, and the population is estimated at 3,100.

(6.) No rentcharge for water is paid.

I may add to the above remarks that we have over six millions of gallons of water daily now developed from springs at Grays in Essex over and above what we require for the use of our present customers, and that the above quantity could be easily increased to perhaps two or three times the amount; this, if sent to London, would have the effect of augmenting the stream of the Thames below the points of its discharge; and we are prepared to supply the water in question to any company in London requiring an augmented supply at such a price as to enable them to redistribute it at a profit, taking the scale of prices now charged.

I have the honour to enclose a copy of the last report of the directors of this company.

I am, &c.
(Signed) J. N. Beale,
Secretary.

Godfrey Lushington, Esq.,
Rivers Commission.

APPENDIX No. 4.

Letter from the Secretary of the Chelsea Waterworks Company to the Secretary of the Rivers Commission.

Chelsea Waterworks Office,
Commercial Road Pimlico, S.W.,
Dec. 28, 1865.

Sir,

I have laid your letter of the 20th inst. before the Court of Directors of this company, at their meeting to-day, and am authorized to transmit to you copies of the Acts of Parliament under which the company derives its powers. You will observe by the 7th clause of the Act of 1852 that other General Acts are incorporated therewith.

I am also, in answer to the questions contained in your letter, to forward to you the following information:—

1st. *Steam power.*—The engines now employed on the company's works are equal to 700 horse-power; and other pumping engines of 300 horse-power are also in course of erection.

2nd. *Quantity of water pumped.*—The company are empowered to draw and impound water from the Thames at Seething Wells, for the purposes of their district, and under an agreement with the Thames Conservancy, are authorized to take from the Thames, every 24 hours, a quantity not exceeding 20,000,000 of gallons.

3rd. *The purposes for which the company are authorized to supply water, &c.*—The company are constituted for the supply of water for domestic use; they are also authorized, under their Special Act of 1852, to supply any person or body with water for purposes other than domestic; and under the Waterworks Clauses Act of 1847 they are to keep a supply of water for extinguishing fires, for cleansing and watering streets, and for other public purposes; but no maximum is prescribed for each or any of the services for which the water may be taken.

4th. *The volume of water pumped during the year.*—In the 12 months ended at Michaelmas last, the company pumped an aggregate quantity of 2,900,193,000 gallons. The purposes for which the water is used are so various that it is not found to be practicable to separate the quantities.

5th. *Number of houses, &c.* The number of houses supplied by this company at Michaelmas last was 26,436. The books of the company afford no means of ascertaining the number of the inhabitants.

6th. *Rentcharge.*—Under the agreement before referred to the company are liable to an annual payment of 300*l.* to the Thames Conservancy Board.

I am, &c.
(Signed) Albert Gill,
Secretary,

Godfrey Lushington, Esq.,
Rivers Commission, 2 Victoria Street, S.W.

APPENDIX No. 5.

Letter from the Secretary of Southwark and Vauxhall Waterworks Company to the Secretary of the River Commission.

Southwark & Vauxhall Water Company,
Office, Sumner Street, Southwark, S.E.
January 6, 1866.

Sir,

Your letter of date 20 December 1865 has been laid before the Court of Directors, and I am instructed, in reply, to transmit to you the accompanying statement furnishing the information required.

I am, &c.
(Signed) James Rosseter,
Secretary.

Acts Constituting the Company. Southwark and Vauxhall Water Act 1852, 15 & 16 Vict. c. 158, and certain provisions of 8 & 9 Vict. c. 16, and 10 & 11 Vict. c. 17. Metropolis Water Supply, 15 & 16 Vict. c. 84.

1st. 1,600 horse power.

2nd. By agreement with the city of London, 20 millions of gallons per diem.

3rd. Domestic service, and purposes other than domestic; trades, manufactures, &c., but there is no maximum authorized to be applied to the several purposes, nor have the company any means of specifying the quantity applied to each respectively.

4th. 4,409,600,391 gallons in the year ending 1865.

5th. 73,500 houses, &c., the population being about 447,750.

6th. 300*l.* per annum is paid, not to the Conservancy Board, but to the city of London.

Godfrey Lushington, Esq., Secretary,
Rivers Commission, 2, Victoria Street, Westminster.

APPENDIX No. 6.

Letter from the Secretary of the Grand Junction Waterworks Company to the Secretary of the Rivers Commission.

Office of Grand Junction Waterworks,
Brook Street, Grosvenor Square,
January 8, 1866.

Sir,

I beg to inform you, that your communication dated the 20th ultimo, together with a copy of the Rivers Commission, and a letter from the Home Office, instructing the Commissioners to consider the question of water supply has been laid before the Court of Directors. I am now instructed to transmit to you, for the information of the commissioners, the titles of the several Special Acts constituting and regulating this company, and also information in reply to the inquiries contained in your letter.

Special Acts: 51 Geo. 3. c. 169; 56 Geo. 3. c. 4; 59 Geo. 3. c. 111; 7 Geo. 4. c. 140; 5 & 6 Will. 4. c. 95; 7 & 8 Vict. c. 30; "The Grand Junction Waterworks "Act, 1852; The Grand Junction Waterworks Act, "1855; The Grand Junction Waterworks Act, 1856; "The Grand Junction Waterworks Act, 1861."

Answers to queries.

1st. Engine power:
At the Hampton Works - - 220 horse power.
At the Kew Bridge Works - - 920 Do.
At the Campden Hill Works - - 300 Do.

2nd. Maximum quantity of water authorized to be pumped, 20 million gallons daily.

3rd. Purposes for which the water is authorized to be applied. Domestic service: warming and ventilating, baths, horses, cattle, gardens, fountains, ornamental purposes, working machinery or apparatus, flushing sewers and drains, cleansing and watering streets; for any trade, manufacture, or business requiring extra supplies of water, and generally for the supply of any person or body for purposes other than domestic service, no limitation of the power of supply for these purpose exists other than that above named in reply to the second inquiry.

4th. Total volume of water actually pumped out of the Thames during the year 1865, 3,301,481,005 imperial gallons. It is quite impossible to specify the quantities applied for each of the several purposes.

5th. The number of houses and population supplied by the company: 25,308 houses supplied at the end of December 1865; and assuming an average of nine persons per house, the population supplied would amount to 227,772 souls.

6th. The rentcharge paid to the Thames Conservancy Board is 300*l.* per annum.

I have the honor to be, &c.
(Signed.) Ernest O. Coe,
Secretary.

Godfrey Lushington, Esq.,
Secretary to the Rivers Commission.

APPENDIX No. 7.

Letter from the Secretary and Solicitor of the Kent Waterworks Company to the Secretary of the Rivers Commission.

Kent Waterworks, Deptford,
January 13, 1865.

Sir,

In reply to your letter of the 20th inst., I beg to hand for the information of the Commissioners appointed to inquire into the Pollution of Rivers the following required particulars.

The titles of the several Kent Waterworks Acts are 49 Geo. 3. c. 189; 51 Geo. 3. c. 145; 13 & 14 Vict. c. 59; 23 Vict. c. 78; 25 Vict. c. 44; 27 & 28 Vict. c. 146. The steam power of the company is equal to about 900 horses.

The company have power to take water without limit from the River Ravensbourne, but no water has been taken from it for the last three years, the present supply of water being wholly from Artesian Wells.

The company's works supply 32,412 houses, but as several parishes in the company's district are only partially supplied or are supplied jointly with other companies, no correct information as to population can be given.

I have the honor to be, &c.
(Signed) Griffith Thomas,
Secry. & Solr.

To Godfrey Lushington, Esq.,
Secretary to the Rivers Commmission,
2, Victoria St. Westminster.

APPENDIX No. 8.

Letter from the Secretary of East London Waterworks Company to the Secretary of the Rivers Commission.

East London Waterworks Company,
Office, 16, St. Helen's Place, E.C.,
January 17, 1866.

Sir,

The directors instruct me to reply to the questions contained in your letter of the 20th December last, so far as the accounts kept by the company will enable them to do so.

The Acts constituting the East London Waterworks Company are the following:

East London Waterworks Act 1807
Do. - - - 1808
Do. - - - 1829
Do. - - - 1852
Do. - - - 1853

The only acts which I presume are of any value to your inquiries are,

The East London Waterworks Act, 1853, and the Lee Navigation Improvement Act, 1850.

1. The company have in action steam pumping engines of the aggregate power of 1,100 horses.

2. The company are authorized to pump water from the river Lee, but no limit of quantity is stated by the Act of Parliament.

3. There is no limit under the Acts of Parliament to the purposes to which water delivered by the company may be used or for which it may be supplied.

4. The quantity of water pumped during the last year (1865) was 6,673,236,695 gallons.

None of it was drawn from the Thames.

5. The number of houses in supply at Christmas, 1865 was 87,278; assuming the number of inmates to be 8 per house, the population supplied would be 698,000. The supplies for trade and manufacturing purposes amounted to 1062 in 1865.

6. An annual sum of 2000*l.* is at present payable to the trustees of the river Lee.

I am, &c.
(Signed) E. Bates,
Secretary.
Godfrey Lushington, Esq.
Secretary Rivers Commission.

APPENDIX No. 9.

Letter from the Secretary of the Lambeth Waterworks Company to the Secretary of the Rivers Commission.

Office of Lambeth Waterworks,
175, Kennington Park Road, S.
Sir,
January 18, 1866.

I am desired by the directors of the Lambeth Waterworks, with reference to your letter of the 28th ultimo, to enclose copies of the Acts of Parliament of the Company, and to forward answers to the several questions of the Rivers Commissioners.

1st. *Steam power.*—The engines at present employed to pump from the river are of 600 horses power, and engines of 300 horses power are now in course of erection as duplicates. The company have also engines of 180 horses power worked at Brixton for re-pumping to the higher levels of the districts of Streatham, Norwood, Sydenham, &c.

2nd. *Quantity of water authorized to be taken by the company from the Thames.*—The company are empowered to take 20 million gallons of water per diem from the river under an agreement with the Thames Conservancy Board, dated 24th June 1851.

3rd. *The purposes for which the Company are authorized to supply water, &c.*—The company, under their Act of 1848, are empowered to supply water for other than domestic purposes and under the Waterworks Clauses Act of 1847 they are to supply water for cleansing and watering streets, and for public purposes, but there is no restriction as to the quantity to be supplied.

4th. *The volume of water pumped* during the year 1865 was 3,325,105,800 gallons, but the company have no means of distinguishing the quantities or the various purposes for which it was delivered.

5th. *The number of houses supplied* by the company is 35,348, but the number of persons to whom it is furnished cannot be positively stated. It is calculated, however, from the census that there are on an average about six inhabitants per house in the company's district.

6th. *Rent paid for water taken from river.*—The company pay the conservators 200*l.* per annum in addition to the premium of 1,000*l.* paid when the agreement was entered into.

I am, &c.
(Signed) W. S. Phipps,
Secretary.
G. Lushington, Esq.,
Rivers Commission, 2, Victoria Street.

APPENDIX No. 10.

Letter from the Secretary of the West Middlesex Waterworks Company to the Secretary of the Rivers Commission.

West Middlesex Waterworks Office,
19, Marylebone Road, W.,
Sir,
January 24, 1866.

In answer to your letter of the 20th ulto. requesting copies of the Company's Acts of Parliament and various other points of information, I am desired to forward you herewith copies of the Special Acts constituting this Company; and in reply to your questions to state the following aprticulars, viz.:—

1st. The total horse-power of the Company's engines is as follows, viz.:

	Horse-power.
At Hampton two engines of 105 horse-power each, being duplicated in case of accident -	- 210
At Hammersmith, five engines - -	- 900
At Barron Hill, two ditto - - -	- 70
Total - - -	- 1,180

2nd. The maximum quantity of water authorized to be pumped by this company from the Thames is 20,000,000 gallons per day.

3rd. The company being authorized to supply water for any purpose whatever (see 15 & 16 Vict., cap. 159, sec. 43 & 44,) do not keep separate accounts of the water supplied for the several purposes of household service, street service, manufactures, railways, canals, &c.

4th. The total volume of water actually pumped by this company out of the Thames for the year ending 31st December 1865, is 2,905,926,079 gallons; the average quantity being 7,961,441 gallons per day.

The subdivision requested cannot be given for the reason assigned in answer No. 3.

5th. The number of houses supplied by the company is 35,486; but the company have no data upon which to estimate the population so supplied.

6th. The rentcharge paid to the Thames Conservancy Board is 300*l.* per annum.

I am, &c.
(Signed) W. H. Whiffin,
Secretary.
To Godfrey Lushington, Esq.,
Secretary Rivers Commission.

APPENDIX No. 11.

Letter from the Clerk of the New River Waterworks Company to the Secretary of the Rivers Commission.

New River Office, E.C.,
Sir,
February 6, 1866.

In conformity with the request contained in your letters of the 20th December last and 6th ulto., I am instructed by the directors of the New River Company to forward to you the following information, together with the copies of their Acts of Parliament.

1. The horse-power of the steam engines used by the waterworks of this company presents a total of 1680.

2. There is no specified maximum quantity of water to which the company are limited.

They have the power to take from the River Lea, between Hertford and Ware, 22,435,200 gallons per day, and, subject to certain claims on the water on the part of the trustees of the navigation of the towns of Hertford and Ware, and of the owners and occupiers of the lands through which the river flows, and of the mill owners upon the stream, the company are entitled to take one-half of all the surplus yielded by the River Lea, either in floods or in the ordinary flow, the other half being reserved to the East London Waterworks Company.

The company can, by means of pumping from the lower to the upper ponds, supply the demands of the navigation, and by substituting steam-power, obviate the draught of the mill owners, and thus, when it becomes necessary, avail themselves of the portion of the flow of the river which would, otherwise, be absorbed by those two objects.

The company have power to impound the flood waters to any extent that may be necessary.

3. Water is supplied by the New River Company for domestic purposes, street service, sewer flushing, fire extinction, railways, and trades of every kind. But by no Act has the maximum volume to be applied in a year for each of these purposes been defined.

4. The whole quantity of water which the New River Company drew during the year 1865 from the river Lea was 7,051,300,000 gallons. Their further delivery during the same year from the Chadwell Spring, and other sources, amounted to 1,511,800,000 gallons. But from the mixed way in which the water is taken by many consumers for domestic and other uses, the quantities applied for each of the several purposes cannot be separately returned.

5. The New River Company now supply water to about 112,000 houses, the population of which may probably be reckoned at about 800,000 persons.

6. The rentcharge paid by the New River Company for the water which they take from the River Lea is 1,500*l.* per annum. This sum is paid to the trustees of the River Lea, in addition to a capital sum of 42,000*l.* advanced to the same trustees for navigation works, under the River Lea Water Act of 1855.

I have the honor to be, &c.
(Signed) Fred. Inglis,
Clerk.
Godfrey Lushington, Esq.,
Rivers Commission,
2, Victoria Street, Westminster, S.W.

APPENDIX No. 12.

Paper on Embanking and Draining of the Upper Parts of the River Thames, near to Bampton.—By Wm. Bryan Wood, Esq.

Gentlemen, Chippenham, January 1866.

As I did not, in giving evidence before you, fully state my knowledge relating to that part of the Thames and the adjoining land with which I am well acquainted, and my views as to the best mode of improving that river and those lands, and as I may not have clearly expressed in evidence the meaning I intended to convey, I beg to state in writing what I consider the best mode of dealing with the Thames, and to give information as to the improvements I have made on the lands adjoining the Thames, and the particulars of the costs of those improvements.

The part of the Thames and adjoining lands I am well acquainted with, and to which the following opinion as to improvement will particularly apply, is between Old Shifford and Lechlade, but from the knowledge I have of the river and lands adjoining both below and above those places I believe the same opinions will be generally applicable.

I consider the best mode of dealing with the Thames and the adjoining land would be, to embank the river on each side so as to afford sufficient space between the banks to form a channel for carrying off floods without running over the adjoining lands, the embankments not to follow the bends in the river but to be as parallel and straight as circumstances will admit of, to widen the weirs and lower the sills, and to lower the high-water marks as regard the fishing rights, to prevent the penning of water for fishing at times when such penning would be injurious to the land; to take out the obstructions in the weir, to put sluices in the embankments for turning the water on the meadows for irrigation, to make interior outfall watercourses for draining the land and carrying off the water used for irrigation, to afford more space at some bridges, and to keep up the navigation.

My reasons for advising this mode of dealing with the Thames are:—The course of the Thames is on the highest level of the land through which it runs, and consequently in the best place for irrigation purposes and the worst place for drainage purpose, and the river is liable to overflow its banks after rain, and occasionally to do much damage to the crops on a considerable extent of the adjoining land. Such overflowing is very much increased by the penning of the water for fishing purposes to high water mark immediately after rain when the water should be allowed the freest passage. A very large area of the land adjoining the Thames has not sufficient fall into the Thames even when the water is low to properly drain it, and consequently the produce is neither so good or so much as it ought to be.

A considerable extent of low-lying land not immediately adjoining the Thames suffers from want of arterial watercourses.

The floodings of the land in the winter, and early in the spring, in those places where the water passes rapidly over it, and does so but a few days at a time, is very beneficial; and even where the water does not pass freely, and remains but a short time, the lands are benefited; but when the lands are flooded in the summer, or the floods remain long in the winter and spring, a great part, and sometimes the entire crop, is lost. Much of the land would be greatly increased in value if irrigated properly. The weirs are now so narrow and shallow for the drainage area the Thames receives, that they tend to increase the number of the floods.

A navigable river must advantage a property through which it passes; at present it may be in a very slight degree in the case of the Thames from Newbridge to Lechlade, but as acting for a landowner adjoining the river in that district, I would rather have it remain navigable.

I believe the charges on the boats and the condition of the river has in a great degree made it of so little use as it now is.

By embanking the river as I have before mentioned, all the lands inside the banks would be protected from the floods, and by putting sluices in the embankments the water could be by aid of the weirs turned over the lands for irrigation at all necessary times. The lands between the banks, from the rapid flow of the water over it, and by its receiving the first deposit from the river, would become more productive than the land inside the bank, but would be liable to be damaged by summer floods. The chance of damage by summer flooding would be lessened by the widening and deepening the weirs, and by a greater control over the fishing rights.

By making interior outfall watercourses, the whole of the low-lying lands bordering the Thames might have thoroughly good outfalls secured to them.

The watercourses themselves would drain a large extent of land without any under-draining, and would carry away all the water turned out of the Thames for irrigation. For instance, an interior outfall watercourse might be made from Old Shifford to Lechlade altogether independent of the Thames; another watercourse on the opposite side of the river from Duxford would drain the whole of the land on that side up to Eaton Hastings parish.

The maintaining the weirs would be necessary for irrigation purposes, and for keeping a sufficient quantity of water in the river in dry seasons as well as for navigation and fishing.

The maintaining the present high-water mark for irrigation and navigation would be no injury to the lands after the embankments and interior outfall watercourses were made.

The opinions I have herein given are founded on the following experience. In 1853 I was the valuer in the Bampton and Shilton inclosure, comprising about 3,000 acres of land, 2,000 acres of which was liable to be flooded, and nearly all without any sufficient outfall for under-drainage, many acres of the meadow land had been under water for nine months in the previous season, and in May 1853 the only vegetation to be seen on hundreds of acres in the meadows was an occasional blade of sedge peeping through the brown scum left on the meadows by the long continued floods. The arable lands were without any outfall for under-drainage, and very wet, the crops being sometimes destroyed by floods. When the land was flooded, there was one continuous sheet of water for three miles at a right angle from the Thames.

I made an interior outfall watercourse for the lands to be inclosed, commencing at Old Shifford, being 38 feet 8 inches wide and level on the bottom for half a mile. The watercourse continued from that point to rise at a regular inclination of eight-tenths of a foot in a mile for two miles to the Tadpole Road. I made another outfall drain to take the water from the highest level, which watercourse discharged into the Thames near Newbridge, and embanked that watercourse from the lower land. I made several other watercourses, and I also embanked the whole of the land from the Thames floods. Plans and sections of the lands in the Bampton and Shilton inclosure, with the watercourses and embankments laid down on them, also the comparative level of the land with the high-water mark at Tadpole is sent herewith.

The high-water mark was above the level of a large portion of the land. The water from the Thames held up the water from the higher levels, and the land was so flat that it took a long time when flooded to get free of water.

Since the inclosure I have been the agent for about 2,000 acres of the land enclosed. I have expended 5,000*l.* in under-draining the arable part of that estate, and about 100 acres have been regularly watered from the Thames by sluices in the banks, which have answered so well that I am about to expend a further sum in improving and extending the irrigation.

The herbage of the whole of the meadow land is greatly improved, and haymaking has been successfully carried on when the river was above the level of the land, and the crops of the lands on the opposite side of the river carried off by the flood.

The under-drainage is from 4 to 8 feet deep, and varies from 8 or 9 chains to 9 yards apart.

All the land that has been sold since the inclosure has realised more than double what it was worth before.

The whole cost of the inclosure, which included making several miles of road, was under 9,000*l.*, about 5,000*l.* of which was expended in watercourses and embankments.

I have no doubt that, at a moderate calculation, the crops over the 3,000 acres, in some rainy seasons we have had since the inclosure, have been worth 9,000*l.* more than they would have been if the land had not been improved.

A considerable extent of land in Bampton parish outside the inclosure is greatly increased in value by the works described.

The river opposite the embankment has been scoured out and improved by the floods since the embankment was made. The embankment has not given way in any place.

The cost of the embankment was 16*s.* 6*d.* per chain. The cost of the large watercourse for 127 chains 69 links was 1,143*l.*; the cost of the watercourse, from its junction with the large watercourse to Bampton Road, 89 chains, was 650*l.*; the cost of the watercourse joining the two last-mentioned watercourses, was 337*l.* 10*s.* 0*d.* for 70 chains; the other watercourse, which averaged about 6 feet deep and 1 or 2 feet wide on the bottom, cost from 30*s.* to 40*s.* chain, or 3*d.* to 3½*d.* a cubic yard, the earth being placed about 1 yard from the sides.

I have since been valuer in the Wadley inclosure, in which there were 290 acres of common meadow, which were liable to be flooded from the Thames, and for which there was no outlet for under-drainage; and a common of about 260 acres, which together with other lands was embanked from the river by an ancient embankment, but which was flooded by the overflow of a small watercourse and greatly damaged by stagnant water, there being no sufficient outfall for the surface or under-drainage.

Under my powers as valuer in that inclosure I made an outfall watercourse, 305 chains 47 links long, from the Thames at Duxford to the lowest point of the land to be inclosed, by clearing out and deepening an old watercourse for 60 chains, at a cost of 90*l.*, and by making an entirely new watercourse, 245¼ chains, at a cost of 491*l.* 10*s.*, and I embanked the land through which the new watercourse passed from the Thames by one embankment, 113 chains long, at a cost of 113*l.* 8*s.* 4*d.*, and by another embankment, 61 chains long, at a cost of 39*l.* 7*s.* 6*d.*, and by using an ancient embankment for protecting the remainder of the land. The watercourse was 4 feet wide on the bottom, at the lower end, and 2 feet wide on the bottom at the upper end, and 6 feet deep; the embankment varied in height from 4½ to 1¼ feet.

The land embanked and freed from floods, and to a considerable extent drained, by this outlay of 734*l.* 5*s.* 10*d.* was about 700 acres. By it also an outfall for under-drainage was afforded to from 200 to 300 acres, lying at a little higher level, as well as an outfall for the 550 acres to be inclosed, and about 250 acres of old inclosed lands adjoining.

The watercourses in continuation through the Wadley lands were made at the same rate of cost, and the embankment against the river cost at an average of about 16*s.* 6*d.* a chain.

I have sent plans and sections of the Wadley inclosure, showing the embankments, the watercourses, and their size and inclination, as well as the comparative and average level of the land at various points.

As regards the effect of the proposed works on the flood water of the Thames, I believe from experience, that although more water will have to pass down the Thames, it will not rise to an inconvenient height. As regards their effect on the water supply I decidedly believe they will increase during the driest months in the year, because when the land was without outfalls and undrained only, the surface water ran from it, and as soon as the surface became thoroughly dry, which it did in an ordinary dry summer, no water drained from the land.

Two outfall drains, each discharging the drainage from about 100 acres of land through a 12-inch pipe, one made about 10 years ago and the other about four years ago, have never ceased from the time they were made to discharge a considerable stream of water.

Other drains, as also the new watercourses, discharge quantities of water long after the time water would have run from the land in its unimproved state, but I cannot certainly say they never cease, although I think several do not.

Power to make and compel the maintenance of these improvements, and to regulate the irrigation, navigation, and fishing should, I think, be vested in a body who were paid, and who had no interest in any part of the river.

I beg to remain, &c.

Wm. Bryan Wood.

To the Rivers Commissioners.

APPENDIX No. 13.

Paper on the Effect of the Sewage of Windsor and Windsor Castle on the Thames and Lands adjoining.—By W. Menzies, Esq.

Sir, Parkside, February 16, 1866.

In addition to the evidence which I gave to the Rivers Commissioners at their meeting at Windsor, I have now the honour to lay before them some further statements which more fully explain the effects upon the Crown property of the present system of discharging the sewage of the town of Windsor through the Home Park into the river Thames.

Previous to the years 1847 and 1848 the sewerage and drainage both of the town and Castle of Windsor was of the usual composite character that prevailed over the country. There was surface drainage off the streets, and a vast number of cesspools, most of which occasionally overflowed into the nearest ditch; the principal points, however, of delivery for the sewage from the town being into the Thames immediately above and below the Windsor and Eton Bridge, and into the Cranbourne stream or ditch near the Long walk.

In 1840 and following years plans were prepared under the direction of the late Board of Woods and Works (which at that time, and up to 1851, formed one department) to remedy the state of matters that then existed, both as regards the town and the Castle. This scheme was submitted to the corporation and inhabitants of the town of Windsor in order to ascertain whether they would bear a fair proportion of the outlay; but at a general meeting that was called for the purpose of considering the plans the inhabitants declined to do so.

The Commissioners of Woods and Works thereupon proceeded to carry into effect so much of the scheme as was required for the sewering and draining of the Castle; and in 1845 and 1846 a large sewer was constructed from the Long walk, at the point D, to the Thames at E of the following dimensions:—The length from D to E is 1,617 yards. The point E is at the lowest summer level of the river. The dimensions of this sewer at the mouth are 7 feet 3 inches high, by 5 feet 3 inches wide, and the amount of fall from the bottom of the sewer at the point D to the outlet at E is 3 feet 3 inches, which gives about 1 foot for every 500 feet lineal. This main sewer on its way to the Thames received, and still continues to receive, the sewage and drainage of Frogmore, the Royal farms, buildings, the Kennels, and other buildings belonging to the Crown in the Home Park, including all rain and surface water from these buildings, besides an overflow from a small pond at the Royal aviary, supplied with a fountain, and the overflow from the lake at Frogmore, which lake again is kept filled from a main water course flowing out of Windsor Park near the Double gates. The sewage and drainage of the Castle, including all the rain and surface water, continued for about 18 years to be discharged into this main at point D, near the Long walk.

Openings were formed at two places, where a man can enter to clean and inspect the sewer; and further to provide against the effect of the Thames rising and blowing up the roof of the sewer, large openings, some, but not the whole of which, have since been covered in, were left at the outlet near E without any covering, and an overflow into the Home Park was left, at the point shewn, near the Royal kennels. Along the whole line, from the Thames to the Long walk, small square openings on the surface at every 22 yards were left, I presume, for ventilation. There were also left two large gratings opening on to the surface, one in the meadow near the Long walk, and one in the field opposite Frogmore.

The only addition that this sewer has received since its original construction along this part through the Home Park has been when in 1856 and 1857 the land of the Home Park around it, in extent probably 100 acres, was drained for agricultural purposes; the main drains were all discharged into it.

As an assistance to the flushing power at command in the Castle itself, a large flushing tank was made by erecting a stop wall where shewn in plan No. 1 at letter C, on the line of the Cranbourne brook coloured blue on the plan, and a connexion made with it and the main sewer at the point B.

At the entrance of the flushing drain inside this last-mentioned tank is a valve to dam the water back and let it go with a rush when wanted for flushing. A large iron grating was placed across the line of the stream in front of the flushing door, and another wooden one at the mouth of the archway at the back of the houses in Adelaide Place.

A dead wall was built and overflows provided, so that when the flushing drain would not take all the stream an outlet might be available through, below the Long walk into the old channel of the brook across the Home Park, which channel was covered over and arches made at the crossings of the roads all the way down to the Thames.

In the year 1849 the Local Board of Health of the town of Windsor passed a resolution to carry out the main sewerage and drainage of the town, according, as I believe, to the plans that had been prepared in 1840, and the Commissioners of Woods and Works permitted them to make use of the then existing Castle sewer, into which the whole of the sewage of the town, including rain and surface water, were accordingly carried. The junction of the town sewers with the Crown main sewers is shewn at the point B. In consideration of that permission, and the Crown's constructing a part of the town sewer, the local board undertook to flush the whole of the main throughout the town and down to the Thames at E by a supply of water from the river at the Goswells. In granting that permission I am not aware that the Crown became responsible in regard to any works that may be necessary to obviate the nuisance that has been found to arise from the passage of the town sewage through the Castle sewer, and from the ultimate deposit of sewage in the river, and after floods on the surface of the Home Park.

The sewage of the Castle and mews continued to be discharged into the main sewer at the Long walk until 1864, when under the direction of the Commissioners of Works, who were then, and are now, in charge of the Castle, a new sewer was laid down from the junction at the Royal mews, where I have shewn it, and the whole sewage of the Castle and mews was carried direct and separate into the Thames.

The charge of the drainage of the several districts shewn on the accompanying plan is now, therefore, held as follows:—

The sewerage and drainage of the area shaded "pink" is under the sole charge of "the Mayor and Board of Health "of Windsor" until the whole is discharged at the outlet near the Long walk, marked B on the same plan.

The whole of the sewerage and drainage of the area of the Castle shaded "brown," until it is discharged into the Thames at the point marked F, rests with "The Board of "Works, Palaces, and Public Buildings." The charge of the sewerage and drainage of the other buildings shown in the Home Park rests with the same Board, until the sewers are discharged into the main sewer, colored "pink," running through the Home Park.

The whole of Cranbourne Brook colored "blue," from where it rises in Windsor Forest and Park, in so far as it passes through land under the care of "The Commissioner of Woods," is under his charge until it enters the flushing tank in Sheet Street, as also the connexion between it and the main sewer at B, near the Long Walk, and thence to the Thames at E. The old watercourse of the Cranbourne Brook colored "blue," in so far as the provision of a water way is concerned, may also be included under the same charge. These last-mentioned portions were placed under the care of the Commissioner in 1851, and have for some years been superintended by myself as his local officer. The charge of the surface of the Home Park itself, and the consideration of any changes affecting the comfort of Her Majesty and the Royal Family, rests with the officers of the Royal household.

With regard to the portions of the drainage that are under my charge, I may state that—the Cranbourne Brook is the natural discharging outlet of surface drainage and rainfall from an area probably of some 1,500 acres in extent, of which 700 acres are at present in permanent pasture, 300 acres under cultivation, and 500 acres in woodland. The length of its course from its rise to the Long Walk is about four miles, and the fall from the highest point to the flushing tank is about 100 feet. The whole of the area which feeds it is London clay, both soil and subsoil. There are no underground storing beds in this portion of strata which will retain water for a time, and afterwards gradually discharge it, so that the effect of heavy or ordinary rains is that the waters not evaporated are quickly sent down off the surface, and in long dry weather the stream ceases entirely. Since the brook was thus diverted for flushing purposes, nearly the whole of the land under grass, and that under cultivation that feeds it, has been agriculturally drained at 4 and 5 feet deep, the effect of which is, by creating a porous absorbing sponge of earth, to moderate the rapidity of surface floods, and lengthen the period during which they are discharged.

Practically, the effect, however, has not been discernible. The main sewer which carries town sewage through the Home Park to the Thames retains a large quantity of sand and at the present time about 50 tons of sand are annually removed or rather pushed along by the labourer in charge between point B. near the Long Walk and the Thames. Some of this sand is brought to the surface. The man in charge occasionally dams back the whole stream by means of flushing gates, and sends the remainder out by the rush of water.

The expense of attending to the flushing tank in the Cranbourne stream and keeping clean the main sewer through the Home Park, as well as filling Frogmore Lake, is about 80*l*. a year, paid out of the land revenue. How much sand in addition to that quantity of 50 tons I have mentioned passes down annually into the Thames in suspension in the water flowing through the sewers I am unable to estimate, but no doubt it is very considerable.

The material so taken out from the main sewer in the Park, containing such a large per-centage of sand, is worthless as a manure and realizes nothing.

The Crown consequently obtains no return, therefore, for the annual outlay incurred in keeping in order the main sewer, which, since the diversion of the Castle sewage is almost entirely required for the passage of town sewage.

I shall now proceed to describe the effect of these sewerage and drainage works upon the Home Park and the river Thames at the main outlet near Albert Bridge. The river in dry weather immediately opposite this point has a current of scarcely half a mile an hour in the centre of the stream, while it is slower at the sides, and it may be spoken of as all but level in ordinary times down for 900 yards, as far as the weir and locks erected for the benefit of the navigation.

The highest flood that has been marked for many years was that of November, 1852, when the river at this point was 10 feet 6 inches above its lowest low water level; in the first week of October last year (1865), that being the lowest ever known, and exactly the bottom of the main sewer from the town.

It is right that I should here mention that, as I understand 10 feet 6 inches is a greater difference than what exists between the highest and lowest known levels of the Thames, both above and below Albert Bridge, I think there is no doubt but that the flood is heightened at this point by the archways of this bridge not being sufficient, and by the high embankments on the sides checking lateral extension of the water.

Between these two highest and lowest points the river varies according to the seasons and the time of the year; but, from my own observation, it may be stated, that the ordinary winter level of the river is only about 3 feet above the lowest summer level; and if we have in any two consecutive months in the winter an aggregate rainfall of between 4 and 5 inches over the country generally, the river will rise about 4 feet 6 inches more, and for the time being completely shut the mouth of the main sewer from the town, and also the new drain from the Castle made two years ago.

This happens, I may say, every winter, and in February of last year (1865) lasted for six weeks. During the whole of that time none of the solid matter from the town and Castle could pass into the river, and it consequently lay accumulated in the sewer until it became most offensive and putrid for a length of 600 yards, at least, upwards from the river towards the Long Walk and through the Home Park.

Had this flood risen 1 foot 6 inches more, as it has frequently done before, an immense portion of the floating part of the sewage would have been discharged over the Home Park through the open spaces left near the river, to the great nuisance and risk of disease to all residing at the time in the Castle and its neighbourhood.

The last time this happened was in March, 1862, when the filth had to be raked off the grass and shovelled up and pushed again into the river.

During the whole of these times of flood there could be no true delivery of sewage either from the town, Castle, Frogmore, or any of the buildings in the Home Park, and there was great risk of dangerous effluvia being given off through the several ventilating outlets along the line of main-sewer through the Park. In dry weather, but especially towards the end of summer when the river is as low as it has been in 1864 and 1865, any one can understand the nuisance that must occur from the whole of the sewage and other fluid refuse of so large a population being discharged into a river with an ordinary current so slow, and immediately opposite that part of the Home Park attached to the Castle as pleasure ground for the Royal family.

It will be observed that there is a bend in the river, immediately below the mouth of the sewer. This bend has the effect of sweeping round all floating filth and lodging it up against the bank, from which people have to be constantly employed to push it with rakes into the middle of the stream. The solid parts of the sewage float and keep on the top for about three miles down the river, until lodged up against something and there become dissolved. At the weir and the locks, about 900 yards below Albert Bridge, where floating weeds are arrested by the wooden posts, and cause great accumulation.

In the second week of November 1864 I had to direct the removal of a putrid bed of sewage sludge, 5 feet deep, immediately opposite the mouth of the sewer, and can testify to the bed of the stream for a mile down having a thick, slimy deposit, and deep beds of the same material.

When easterly winds blow in spring, and the river is low, the great mouth of the main sewer open to the east receives the wind, and any foul sewage gases are either given off and discharged into the Home Park below the Castle, or else they are forced back into the town. In the joint report made by Mr. Simon and Mr. Austin in 1859 the action of the wind in this manner is specially referred to as one of the probable causes of an epidemic of typhoid fever and scarlatina which prevailed in Windsor during a portion of the year 1858.

The probable agricultural value of the sewage contents of the Home Park sewer had frequently before this attracted attention, and during the lifetime of the Prince Consort plans were thought of and proposals made to utilize the sewage by distribution over the land. As the main sewer was all below the surface, and pumping had to be employed to lift the material, it soon became obvious that any attempt to manage a stream that was running perhaps 6 inches deep to-day, and might be 6 feet deep and laden with sand next week, would end in imperfection and failure.

The dry weather flow of sewage might have been controlled if it had been kept separate, but every arrangement would have broken down during the first rains.

In conclusion I think it right to observe that as the town of Windsor contains a population of nearly 12,000 persons, it will be apparent that the sewage and drainage from the Castle, the Royal Mews, Frogmore, and other buildings in the Home Park form comparatively but a small proportion of the total quantity that is poured down into the Thames at the outlets F and E, shewn on the plan, and which now cause the foul condition of the river at and below these points, and the offensive deposits on the surface of the Home Park during floods.

I am, &c.
Wm. Menzies.

Godfrey Lushington, Esq.

APPENDIX No. 14.

Extract from Report of Registrar General of Births and Deaths, for Week ending February 24th, 1866.

The London Water Companies.

Average Daily Supply of Water for the month of January. It appears that the average Daily Supply is at the rate of 206 gallons of water per house, including manufactories; or 26 gallons to each person. The Analysis of the Waters for February is by Professor Frankland, F.R.S., of the Royal College of Chemistry.

Companies.	Number of Houses supplied in January, 1866.	Average daily Supply of Water in Gallons during the Month of January, 1866. (*See Note*)	Solid Mater in 100,000 parts of the Waters.	Organic and other Volatile Matter included in Column 4.	Amount of Oxygen required for oxidation of Organic Matter.	Total Hardness.*
Thames.						
Chelsea - - - - -	26,436	7,658,800	31·14	2·59	·0912	21·1
West Middlesex - - -	35,486	7,657,423	30·40	2·00	·0739	19·8
Southwark and Vauxhall -	73,594	12,125,000	30·90	2·40	·0643	20·7
Grand Junction - - -	25,308	8,067,112	31·40	1·60	·0555	22·2
Lambeth - - - - -	35,420	7,620,200	31·16	1·65	·0592	21·0
Other Sources.						
Kent - - - - - -	32,412	5,376,676	37·92	1·80	·0104	27·4
New River - - - - -	111,864	22,330,000	29·50	1·68	·0576	22·0
East London - - -	88,340	17,592,000	32·78	1·68	·0636	23·1
South Essex - - -	750	161,000	40·60	1·36	·0086	26·5

* The degree of Hardness hitherto employed by chemists is that first proposed by Dr. T. Clark, viz. one grain of carbonate of lime, or its equivalent, in one Imperial Gallon of Water, or one part in 70,000. The degrees of hardness used in the above Table are readily converted into Clark's degrees by multiplying by 7, and then moving the decimal point one place to the left.

Note.—The quantities of water here given include the supply for manufactures and for various purposes other domestic consumption.

The table may be read thus: The Chelsea Water Company supplied 26,436 houses and an average daily quantity of 7,658,800 gallons in the month of January; 100,000 pounds of Chelsea Water in February contained 31·14lbs. of solid matter, of which 2·59 lbs. of organic and other volatile matters were driven off by incineration. ·0912 lbs. of oxygen was required to destroy organic matter in the said quantity of Chelsea Water. 21·1 lbs. are carbonate of lime or its equivalent.

The fourth column of this Table contains the amount of solid matter left on evaporation and desiccation at 120° C.—130° C. (248° F.—266° F.)

The Results are recorded in 100,000 parts. By moving the decimal point one place to the right the above figures express in milligrams the quantity contained in one kilogram of the several waters.

In comparison with the month of January the majority of the waters exhibit an increase in the total amount of solid impurity: the West Middlesex, New River, and East London Companies waters form the only exceptions to this rule. The amount of organic and other volatile matter is also greater in all the waters except those of the Grand Junction, Lambeth, East London, and South Essex Companies. Lastly, a larger quantity of oxygen is required for the oxidation of the organic matter than in the preceding month; the Chelsea, Grand Junction, South Essex, and Lambeth Companies' waters only being excepted.

The waters of the Chelsea, Southwark, Lambeth, New River, and East London Companies were turbid when drawn from the Companies' mains.

APPENDIX No. 15.

Letter from the Secretary of the Rivers Commission to the Governor of Stafford Gaol.

Rivers Commission, 2, Victoria St.,
Westminster, S.W. Jany. 18, 1866.

Sir,

I beg to send you a copy of the Rivers Commission. The Commissioners having heard that the sewage of Stafford gaol is successfuly applied to the land, are desirous to learn some details of the process employed. On the accompanying paper I have put down some heads upon which they would wish to have specific information, and they would be much obliged to you if you will kindly furnish it to them, together with any remarks that may occur to you. Apologizing for the liberty I take in asking you to put yourself to so much trouble,

I am, &c.
(Signed) Godfrey Lushington.

To the Governor of Stafford Gaol.

APPENDIX No. 16.

Letter from the Governor of Stafford Gaol to the Secretary of the Rivers Commission.

County Prison, Stafford,
January 22, 1866.

Sir,

In reply to your letter of the 18th instant and enclosures, I beg to inform you that the whole of the sewage from this prison is led off in our large sewer into the grounds of the County Pauper Lunatic Asylum, which are separated from the prison by a wall only, and is there, in addition to the lunatic asylum sewage, used to improve the meadow land attached to that institution. I have therefore obtained from Dr. Brown, the medical superintendent, answers to the several questions you put to me, as he is the manager of the works. This arrangement has been in operation rather more than a year, and has been certainly, as far as freeing the neighbourhood of a horrible stench, a great success, as before the present plan was adopted the whole of the sewage was conducted into a large tank, and from time to time flowed over the meadows.

With the exception of these two institutions, I do not believe there is a single sewer in the town of Stafford, the only drainage being from the gutters at the sides of the streets, into which for the most part flow gutters from the houses over the pavement. There are also two small brooks which flow round part of two sides of the town, which are open, and are the receptacles of all the filth from the adjoining houses, and being open, and often in dry weather very low, are a fertile source of fever; they both find their way into the rivers. On the whole, I should say that this town is as badly off for drains as any in England, and in dry weather as full of bad smells as Cologne.

I have, &c.
(Signed) W. Fulford, Governor.

Godfrey Lushington, Esq.

APPENDIX No. 17.

Sewage Irrigation at Stafford Gaol.

Questions.	Answers.
1. The number of persons whose sewage is applied?	Above 1,300 persons, of whom 700 are in the county gaol, and 600 in the county lunatic asylum.
2. Number of gallons per head of daily water supply?	2½ gallons per head per 24 hours.
3. Is the surface water combined with the sewage proper?	Yes, it is; and also all the drainage from the asylum farm.
4. Is the solid matter separated from the liquid? If so, by what process, at what cost, and to what purpose is it applied?	No, the solid portion mixed with the liquid flows at once on to the ground without any separation.
5. Is a disinfectant used? If so, what, and at what cost?	Yes, carbolic acid mixed with lime water is used; at a total cost of 2*s.* 9*d.* per day, including labour.
6. Total quantity of liquid applied daily in gallons?	At ordinary times 36,720 gallons flow on to the land during 24 hours; but when flushing, the sewage flows on the land at the rate of 5,400 gallons per hour.
7. Does the liquid flow by gravitation? Or is it pumped? If pumped, what is the size of the pump, and what is the annual cost of pumping?	Yes, it flows by gravitation alone.
8. How is the liquid distributed, by hose and jet, or by open carriers, or moveable iron troughs?	It is distributed by open brick gutters and moveable iron spouts semicircular in shape, 6 ft. in length, with sockets at the end, and lateral openings, to which are affixed lateral wooden spouts, according to distance required.
9. As to the land to which the sewage is applied; what is its distance from the gaol, its total average, its soil; how was it laid out to receive the sewage; and at what cost; what crops does it bear, hay or vegetables, or pasture grass?	The nearest point is 500 yards from the gaol. The total amount is 34 acres of meadow land; the soil is peaty; it is naturally flat, and not altered to receive the sewage. It is all laid out for grass, of which it produces 2½ tons to an acre for hay besides grazing during the year.
10. Over what extent of land is the sewage daily passed before it flows off; and how long does it take to flow off? Does it flow off clear? And into what does it flow off?	It passes over about half an acre per day, and is principally absorbed by the land; that which does flow off is clear, and passes almost insensibly into a brook which intersects the meadows.
11. Taking into account on one side the interest of capital laid out, and the annual expenses, and on the other the improvement to the land, does sewage irrigation answer as an agricultural speculation?	Decidedly it does; by its use, land, especially grazing land, must be rendered more valuable.
12. Does it answer as a sanitary experiment. Is there any smell or nuisance or sickness resulting from it?	Most undoubtedly it does answer. The sewage acted upon by the above-mentioned process is quite deprived of all smell and properties injurious to health; although the experience is short, it is believed that the quantity of grass will be improved.

APPENDIX No. 18.

Paper upon the Management of the Sewage of Broadmoor Criminal Lunatic Asylum.—By Wm. Menzies, Esq.

March 9, 1866.

This asylum and its court yards, &c. occupy about 25 acres of land. The roofs of the buildings are three acres in extent.

The soil and subsoil are gravel and sand.

The population is at present about 600, with the probability of increasing to 1,000.

The water supply is from the stream in the valley beneath, pumped up by a steam engine to a water tower, from which it is distributed over the whole buildings, and is about 40 gallons per head daily, and never fails.

All this is discharged again every day through the sewage drains.

The whole of the rain-fall from the roofs is conducted by a special set of drains into a large tank, from which it is pumped for laundry purposes.

There is never any overflow.

The rain water from the surface of the court yards is received in small gratings, and flows away by underground drains into the nearest ditch or gravel pit.

The sewage drains are shown in full " black " lines on the accompanying plan, and communicate only with the baths, kitchen, and waterclosets.

Nearly all the soil pipes are ventilated by pipes reaching high over the roof: a process which is essential, and much safer than any ventilation by openings in the ground.

In the summer of 1864, on examining the whole of these arrangements, I advised that, if necessary, further flushing and ventilating pipes might be put in at the points A, B, C, and D; but as the ordinary water from the baths, closets, &c. is so abundant, and so many soil pipes are now acting as outlets for any foul air generated in the drains, no change has yet been necessary. Additional flushing and ventilating arrangements may be required when the building is more fully occupied, partly from the desire to save the rain water for the purposes of the laundry, and partly from the conversations I had previously had with Sir William Hayter, the chairman of the Council, and partly from those other causes stated by me in my evidence before the Rivers Commissioners at Windsor, the system of entire separation of the rain-fall water both off the roofs and court yards from the sewage—water proper had been kept in view in the construction of the building in the years 1862 and 1863. Nothing had therefore to be undone on my proceeding to complete the process of utilization.

My reasons for advising the separation of the rain-fall from the sewage were as follows:—

Under such a system there is no danger of sand or other solid matter getting into the sewage drains, either from the roofs or from the court yards, and so arresting the flow of the sewage; a difficulty which I had often elsewhere had before me.

There is no danger of foul air coming back from the water gullies in the court yards in dry weather during the summer, and no expense is incurred in keeping them filled, if necessary, with water to make them act as traps.

The foul air from such gullies, when they communicate with the sewage drains, has, to my own knowledge, been the cause of fever and deaths in more than one case.

The sewage drains are reduced to the minimum size, and are thus so far economical, while the flushing water works better, and has not a dead weight of sand or other solid matter to act against. The flushing power at command being abundant and uniform, which is the only safe system, there is no necessity for any additional help by the rain in wet weather. All uncertainties in the dilution of the sewage are obviated, and no attention is necessary to the irrigation works during the night, as the sewage drains then comparatively cease to flow. Were it otherwise, the discharge during the long winter nights in wet weather, while it could not be beneficial to the land, might be a serious matter to deal with.

My experience and observation have led me to believe that, taking all the year round, anything above 15 or 20 gallons a head is beyond the most beneficial dilution of sewage for agricultural purposes, and that the expense of distribution, when the quantity per head is greatly in excess of that, is not compensated by any benefit arising from the increased volume of water in which the sewage is embodied. At Broadmoor it was necessary to deal with 40 gallons a head, but that could not be helped, and the supply being regular and uniform, could be managed. Where an abundance of water has been deemed an advantage for irrigation by sewage, such abundance has not, I believe, been thought beneficial as adding a source of fertility; but useful merely as a mechanical agent on somewhat flat land to enable the solid matter to be more equally distributed.

The mechanical separation by filtration of the solid matter from the liquid and the use of the latter (rendered thus so much more ductile) for purposes of irrigation, is more economical, and far better than putting the solid and liquid matter on the land together, and gives the maximum of strength to the liquid when not diluted by the rain-fall as compared with the sewage and rain-fall mixed.

The irrigation by fixed quantities of sewage water reduces the cost of distribution to the minimum, and is thus more profitable, and requires less attention and labour to look after, and any advantage and profit arising annually from this should be capitalized and considered in the estimate of the cost involved in the original construction of the drainage works, as against any apparent cost in separating the rain-fall from the sewage.

The rain water coming down the same drain as the sewage water, would in wet weather discharge a great quantity of accumulated water upon a much smaller area under crop, just when the earth was least fitted to receive it, and in dry weather, when the land would most beneficially take it, there could be no rain-fall to assist the dilution, while for sanitary reasons the ordinary flushing from a reliable source should in dry weather be abundant. Small sewage drains laid to take part of the rain-fall and have overflows would not have been advisable at Broadmoor, because the overflow water would have been polluted, and as they would have acted probably 100 times in a year, could not under the provisions of the law be discharged into the stream in the valley. The stream is not a large one, and supplies the village below with water. Even then a special covered drain for fully half a mile in length at great expense must have been laid down to take this overflow, whereas the surface drains are open outside the building, and the water usefully applied. There would also have been the danger when every heavy rain-fall began to abate of some of the sewage matter just overflowing and not being able to reach the stream for want of water to flush it along.

The preservation of the surface water from the court yards in a pure state was advisable, as it might thus at any time be stored in ponds; and indeed advantage has already been taken of this by forming a small ornamented pond in one of the gardens set aside for the patients.

Further, I was anxious to make a scheme as perfect as possible, one that would work in all seasons and in all weathers, and would enable the whole manurial value of the sewage to be realized.

The filter, of which plans and sections are sent, was placed at the north-east corner of the building, because the south-west wind blows for thee-fourths of the year, and thus would carry off any unwholesome odour that might perchance proceed from it.

The reasons for filtering were: irrigation is then much easier managed; there is no solid matter to lie and decompose on the surface and so create a nuisance. The filtered liquid can go down and up again across a valley, leaving no deposit in the pipes, and thus more land is available and a greater choice given. The irrigation pipes, which are common drawn pipes leaking at every joint, are not likely to become stopped, while the solid matter deposited in the bottom of the filter is mixed with ashes and carted away in an inoffensive state. Uncertain rushes of rain water would have blown up the filter beds and have filled the bottom chamber underneath the filtering beds with sand, if the surface drainage had gone along with the sewage.

The bottom chamber is calculated to hold six weeks' supply.

For some closets in the airing yards, which were too low to drain into the general system, the sewage was brought to a small filtering tank in the garden. Plans and sections of this filter are sent. The irrigation from that tank is done in the same manner.

The whole of the land to be irrigated, coloured "brown," was drained 5 feet deep.

For ordinary purposes of farm—cultivation drainage would have been necessary, as the bottom beds are, in the lower grounds, full of water. Perfect circulation of the irrigating water must be obtained, although of course the amount of underground drainage that is necessary can only be judged practically on the spot. I do not wish it to be understood that I consider underground drainage necessary everywhere; the sewage liquid might flow away too rapidly for purification.

The lowest fields were drained at 11 yards apart, and the pipes used are one size larger than otherwise they would have been; 15 yards apart would have been ample for agricultural purposes. The underground drainage of the upper irrigated land was intercepted at the point E, and arrangements made that the liquid might, if wished, be sent through the process a second time.

No disinfectants or deodorizers of any kind are used in connexion with the sewage drainage outside the building and I see no reason to recommend them.

One ordinary labourer attends to the whole drainage arrangements, and owing to the constant regularity of the system, his time is not nearly fully occupied in that work. No stoppage or disarrangement of any kind has yet occurred since the completion of the works in January 1865. The whole acts by gravitation, and had pumping been necessary the reasons for the system recommended would have been stronger still. In the event of the water from the roofs not having been conducted into the rain-water tank, I should have recommended it to have been taken into the nearest surface drain.

It is impossible to say with any degree of accuracy what these works cost, as the whole was done in a very mixed manner.

Nineteen acres are now under irrigation, and the crop is a mixed one of vegetables and Italian ryegrass. Five crops have been cut in one year off some pieces of this grass sown down in the autumn of 1864.

The solid matter is removed every six weeks, and when mixed with its own weight of ashes is easily removed, and judging by the crops grown where it has been applied, I believe its value to be quite equal per ton to farm-yard manure. It would not be so, if the usual per centage of sand or road grit that exists in many farm drains was along with it.

As to the result of the whole process, both in a sanitary and agricultural light, I can with confidence refer you to the Council of the Asylum, or to Sir William Hayter, as the Chairman of it, who will, I am sure, be most ready to give you all such information upon the subject as you may require.

(Signed) Wm. Menzies,
Deputy Surveyor of Windsor
Forest and Parks.

To Godfrey Lushington, Esq.

APPENDIX No. 19.

Letter from Secretary of Rivers Commission to Right Hon. Sir W. G. Hayter, Bart., Chairman of Council of Supervision, Broadmoor Criminal Lunatic Asylum.

Sir, March 6, 1866.

The Rivers Commissioners would be much obliged if you, as presiding over the Council of Broadmoor Asylum would kindly state the result of your experience of the drainage works carried out at the asylum, more especially as to whether the convenience or health of the officers or inmates has been in any wise affected by the drains, the filter works, or the application of the sewage near to the building.

I am, &c.
(Signed) Godfrey Lushington.

The Right Hon. Sir W. G. Hayter, Bart.,
South Hill Park.

APPENDIX No. 20.

Letter from the Right Hon. Sir W. G. Hayter, Bart., Chairman of Council of Supervision of the Broadmoor Criminal Lunatic Asylum, to the Secretary of Rivers Commission.

South Hill Park, Bracknell,
March 10, 1866.

Sir,

I beg to acknowledge the receipt of your note of 6th March, wherein you inform me that the "Rivers Commissioners would be much obliged if I, as presiding over "the Council of the Broadmoor Asylum, would state the "result of my experience of the drainage works carried on "at the Asylum, more especially as to whether the convenience or health of the officers or inmates has been in "any way affected by the drains, the filter works, or the "application of the sewage near the buildings."

And, in answer, I desire to say that nothing can be more satisfactory, both in a sanitary and agricultural point of view, than the sewage arrangements and the distribution of the sewage at Broadmoor.

These results are materially due to the principle suggested by and practically carried out under the personal supervision of Mr. Menzies, the Deputy Surveyor of Windsor Forest.

The principle is the entire separation of the sewage and the rainfall water. The whole of the sewage being carried away in covered drains to the large receiving tank outside the building, and a separate set of drains being appropriated to the rainfall water, the former is never mixed with the latter; no polluted water can pass along the rainfall drains, and thus no noxious or offensive smells or gases can at any time emanate from any of the gratings, none such are in fact generated.

The number of large open gratings in the yards and about the buildings amount to 134 on an area of about 27 acres.

Had any offensive smell proceeded from any of the open gratings it must have been noticed, but neither the medical officers nor the patients or attendants have ever been conscious of any, and the whole have been remarkably free from any illness or fever which would probably result from offensive drainage.

The inmates are in the whole about 600, and the sewage water is between 30 and 40 gallons per head per day. The whole of this passing away in close covered drains into the large reservoir is there filtered or separated, so that the solid matter falls to the bottom and the liquid matter rises to the top; this latter flows away in earthenware pipes by gravitation to the garden and fields, the former is mixed with ashes and gas lime and is distributed over the land.

The top of the tank or reservoir is covered over with charcoal, and over the whole is a roof.

The tank is about 50 yards from the buildings; no offensive smell proceeds from it, and so rapidly is the sewage water absorbed in distribution that scarcely any perceptible smell arises from it.

The sewage is at present distributed over from six to eight acres of garden ground, and about six acres of arable land.

No separate or detailed accounts of the agricultural results of the sewage have been kept, I can therefore speak only of its value in general terms. In the garden watered by sewage alone, there have been produced the most abundant crops of vegetables. And there are at present on the arable land, also manured by sewage water alone, six acres of most luxuriant Italian rye grass.

The land itself is a most siliceous sand of the lowest description of fertility, worthless except by the application of sewage for any profitable cultivation.

The distribution of the sewage is of the most simple and economical character, and gives only partial employment to one ordinary labourer.

Neither the drains, or the sewage, or the filter works, or the application of the sewage near the building have caused the slightest inconvenience, or in any way affected the health of any of the officers or inmates of the Asylum, of the cottages, or of the buildings generally.

In the above statement I have the full concurrence of Dr. Meyer, the resident medical superintendent of the Asylum.

I am, &c.
(Signed) W. G. Hayter,
Chairman of the Council of Supervision.

Godfrey Lushington, Esq.

APPENDIX No. 21.

Letter from the Rev. Henry Moule to J. T. Harrison, Esq., C.E.

Fordington Vicarage,
Feb. 1, 1866.

Dear Sir,

I am obliged by your letter of yesterday received this evening.

Your question is "If your system were carried out in a " large town, what do you propose should be done with " the slops from washing, cooking, scouring, manufactories, " &c."

My reply is as follows:—My great object in my system is the entire the inoffensive and economical removal from the premises of all excrementitious matter, and this can be effected in any position and under almost any circumstances by the dry earth closet. Into that closet, however, lest the earth be overcharged with moisture, no other liquid than urine should be allowed to enter. If this be strictly attended to the *deodorization both of closets and urinals is perfect*, and the full value of the manure may be preserved. But in addition to this the animal and vegetable matter commonly designated "hog wash," and which is often both in town and country as great a nuisance and source of disease as the old privy vault, may be preserved from offence by placing a vessel containing a sufficient quantity of earth either in the back kitchen or in a shed outside, having holes if you choose at the bottom through which the liquid will drain off into the sewer. I have tried experiments of this kind for a long time, draining my tubs into a tank. The water in the tank *was free from offensive smell and never fermented.* The scouring water, the bath water, and other slops, go now into underground drains in my garden formed of bricks without mortar, having no bottom but the earth, and a slate top. But in a town it would be necessary that this water should pass into the sewers. The loss as to manure would be trifling; the pollution of the river almost nothing. They are doing this now in the experimental work which is now going on under *Mr. Garnet's direction and with the sanction of the Board of Health at Lancaster*, where in a rough way my system is being introduced with great effect.

As to the proportion of water used in closets, I think you will find that taking into account the small quantity used by the lower classes for washing, scouring, and cooking, and the very large quantity required for closets, that for this latter purpose it is for the whole population of a city or town rather large than small. I am sure it is so in this town of 7,000 inhabitants, for whom from 800 to 1,000 tons of water are pumped daily.

I am, &c.
(Signed) Henry Moule.

J. T. Harrison, Esq.

P.S.—With regard to factories, some special remedy must be devised for them. For slaughter-houses the dry earth system is most effectual.

(Signed) H.M.

The following Plans are referred to either in the preceding Report or Appendix, or in the Evidence contained in Vol. II.

1.—GEOLOGICAL MAP OF THE THAMES BASIN.

2.—PLAN OF WINDSOR, WINDSOR CASTLE, FROGMORE, AND HOME PARK.

3.—BROADMOOR ASYLUM.—PLAN SHOWING SEWAGE, DRAINAGE, AND LAND IRRIGATED.

4.—BROADMOOR ASYLUM.—SEWAGE FILTER TANK.

5.—PLAN AND SECTIONS OF SEWAGE FILTER TANK.

6.—RIVER THAMES PURIFICATION.—INDEX MAP.

7.—BAMPTON AND SHILTON INCLOSURE.—PLAN AND SECTIONS OF DRAINS AND EMBANKMENTS.

8.—WADLEY INCLOSURE.—PLAN AND SECTIONS OF DRAINS AND WATER-COURSES.

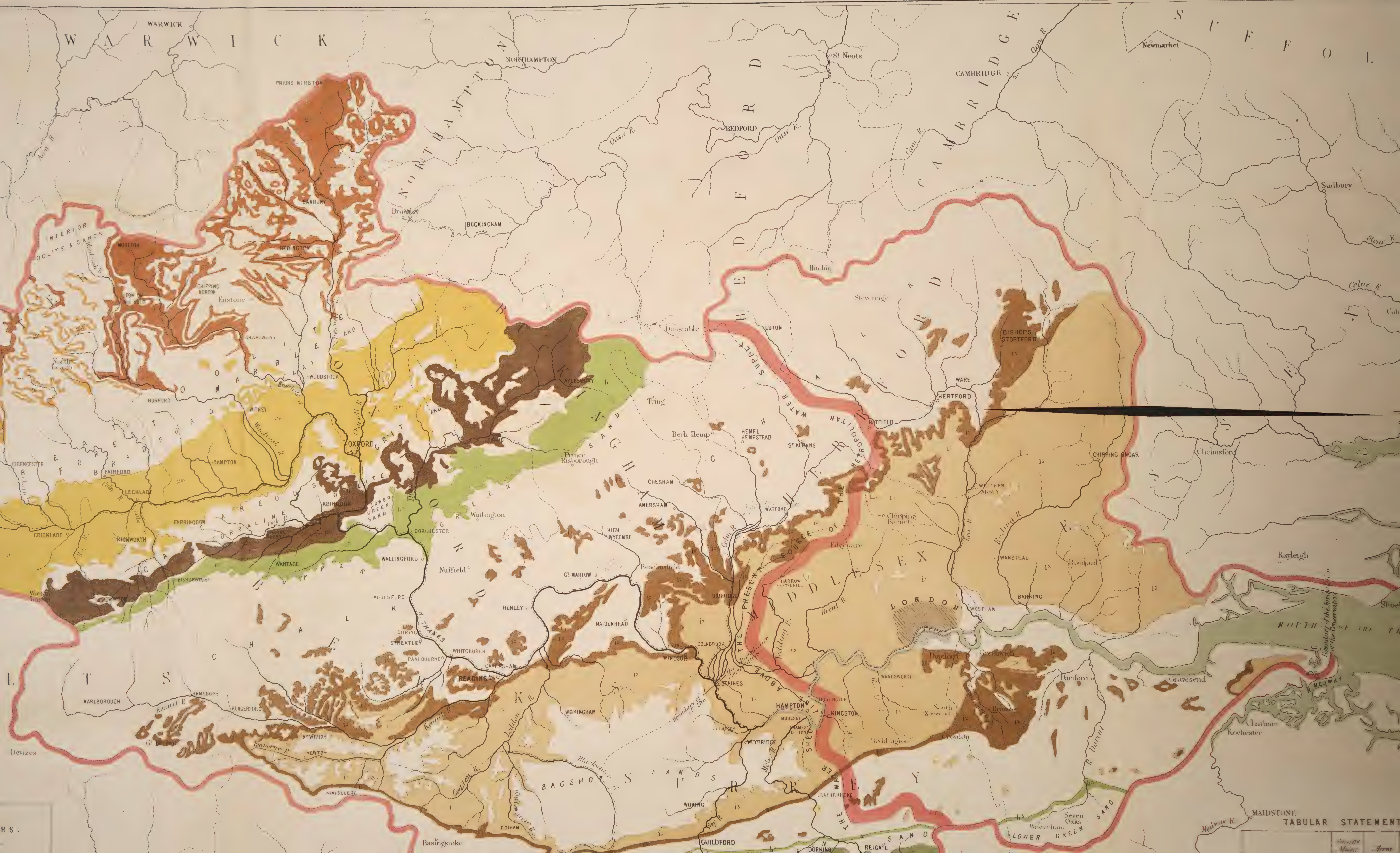
9.—PLAN OF THE DRAINAGE WORKS IN THE VALLEY OF THE TEST.

10.—PLAN AND SECTION OF DRAINAGE OUTFALL, LECHLADE, GLOUCESTERSHIRE.

11.—PLAN OF THE DIGLIS WEIR ON THE RIVER SEVERN.

12.—SECTIONS SHOWING THE ACTION OF THE DIGLIS WEIR ON THE RIVER SEVERN.

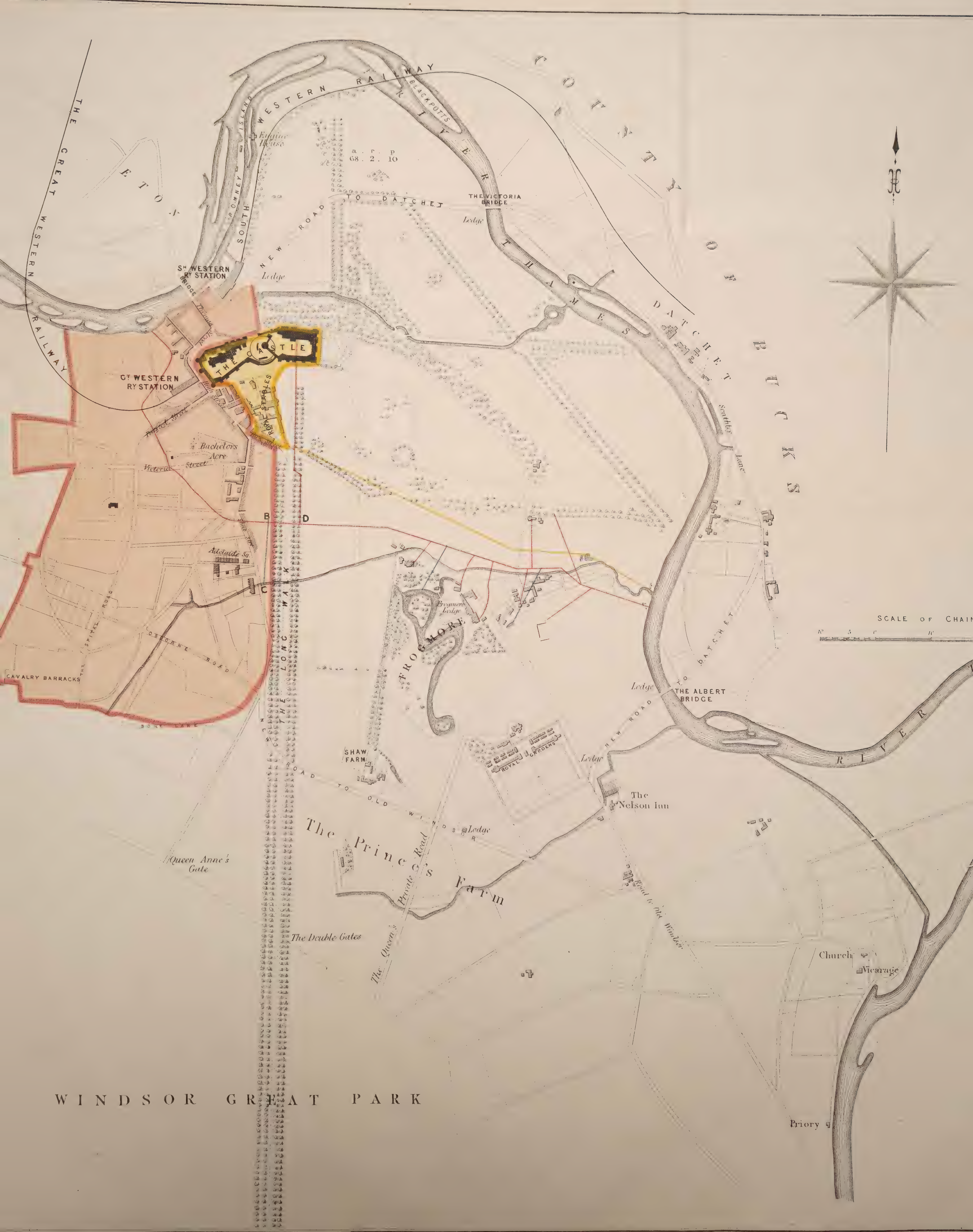
GEOLOGICAL MAP OF THE THAMES BASIN.


WARWICK
WARWICK
PRIORS MARSTON
NORTHAMPTON
NORTHAMPTON
Avon R.
St Neots
BEDFORD
BEDFORD
Ouse R.
Ouse R.
CAMBRIDGE
CAMBRIDGE
Cam R.
Newmarket
SUFFOLK
Sudbury
Stour R.
Colne R.
BANBURY
Brackley
BUCKINGHAM
INFERIOR OOLITE & SANDS
MORETON
BODINGTON
CHIPPING NORTON
Enstone
CHADLBURY
North Leach
WOODSTOCK
BURFORD
WITNEY
OXFORD
GREAT OOLITE
CORAL RAG AND OXFORD CLAY
FOREST MARBLE
CIRENCESTER
FAIRFORD
LECHLADE
BAMPTON
Windrush R.
Evenlode R.
Cherwell R.
CRICKLADE
FARRINGDON
HIGHWORTH
ABINGDON
LOWER GREEN SAND
DORCHESTER
CALCAREOUS
CORRALINE
UPPER GREEN SAND
WANTAGE
BISHOPSTONE
WALLINGFORD
Watlington
Thame R.
AYLESBURY
BUCKINGHAM
Prince Risborough
Tring
Dunstable
Hitchin
Stevenage
LUTON
HERTFORD
Berk Hemp
HEMEL HEMPSTEAD
ST ALBANS
HATFIELD
WARE
BISHOPS STORTFORD
CHIPPING ONGAR
Chelmsford
CHESHAM
AMERSHAM
HIGH WYCOMBE
WATFORD
Chipping Barnet
WALTHAM ABBEY
Edgeware
Lea R.
Roding R.
ESSEX
WANSTEAD
Romford
Rayleigh
BARKING
SUPPLY WATER OF THE METROPOLITAN
PRESENT SOURCE OF THE
Colne R.
Beaconsfield
GT MARLOW
HARROW ON THE HILL
MIDDLESEX
LONDON
WESTHAM
MOUTH OF THE THAMES
Boundary of the Jurisdiction of the Conservators
Shoe
Nuffield
MOULSFORD
HENLEY
MAIDENHEAD
UXBRIDGE
Brent R.
CHALK
GORING
STREATLEY
PANGBOURNE
THAMES R.
WHITCHURCH
READING
LAVERSHAM
ETON
WINDSOR
COLNBROOK
STAINES
Boundary of the Conservators Jurisdiction
Deptford
Greenwich
WANDSWORTH
Dartford
Gravesend
R. MEDWAY
Chatham
Rochester
WILTS
MARLBOROUGH
HAMSBURY
HUNGERFORD
Kennet R.
Gt Bedwin
Devizes
NEWBURY
NEWTON
Enborne R.
KINGSCLERE
WOKINGHAM
Loddon R.
Blackwater R.
BAGSHOT SANDS
HAMPTON
KINGSTON
THAMES DITTON
MOLESEY
WEYBRIDGE
Mole R.
THE WATER SHED
South Norwood
Beddington
Croydon
Bromley
R. Darent
SURREY
KENT
LEATHERHEAD
WOKING
Wey R.
ODIHAM
Basingstoke
GUILDFORD
DORKING
REIGATE
SAND
LOWER GREEN SAND
Westerham
Seven Oaks
MAIDSTONE
Medway R.
TABULAR STATEMENT
RS.

Rivers Commission Report.

PLAN OF WINDSOR, WINDSOR CASTLE, FROGMORE, AND HOME PARK.

Furnished by Wm. Menzies Esqre.
and referred to in his Paper Appendix No. 13.



THE GREAT WESTERN RAILWAY
SOUTH WESTERN RAILWAY
ETON
ROMNEY ISLAND
Engine House
BLACKPOTTS
a. r. p.
68 . 2 . 10
RIVER THAMES
COUNTY OF BUCKS
TO DATCHET
THE VICTORIA BRIDGE
Lodge
NEW ROAD
Sth WESTERN Ry STATION
BRIDGE
Thames Street
THE CASTLE
ROYAL STABLES
Gt WESTERN Ry STATION
Peascod Street
Bachelors Acre
Victoria Street
B
D
C
Adelaide Sq.
SPITTLE ROAD
OSBORNE ROAD
CAVALRY BARRACKS
BOLT LANE
THE LONG WALK
DATCHET
Scathley Lane
Frogmore Lodge
FROGMORE
SHAW FARM
ROYAL GARDENS
TO THE ALBERT BRIDGE
NEW ROAD TO DATCHET
ROAD TO OLD WINDSOR
Lodge
The Nelson Inn
The Prince's Farm
The Queen's Private Road
Road to Old Windsor
Queen Anne's Gate
The Double Gates
Church
Vicarage
Priory
WINDSOR GREAT PARK
RIVER
SCALE OF CHAIN
10 5 0 10

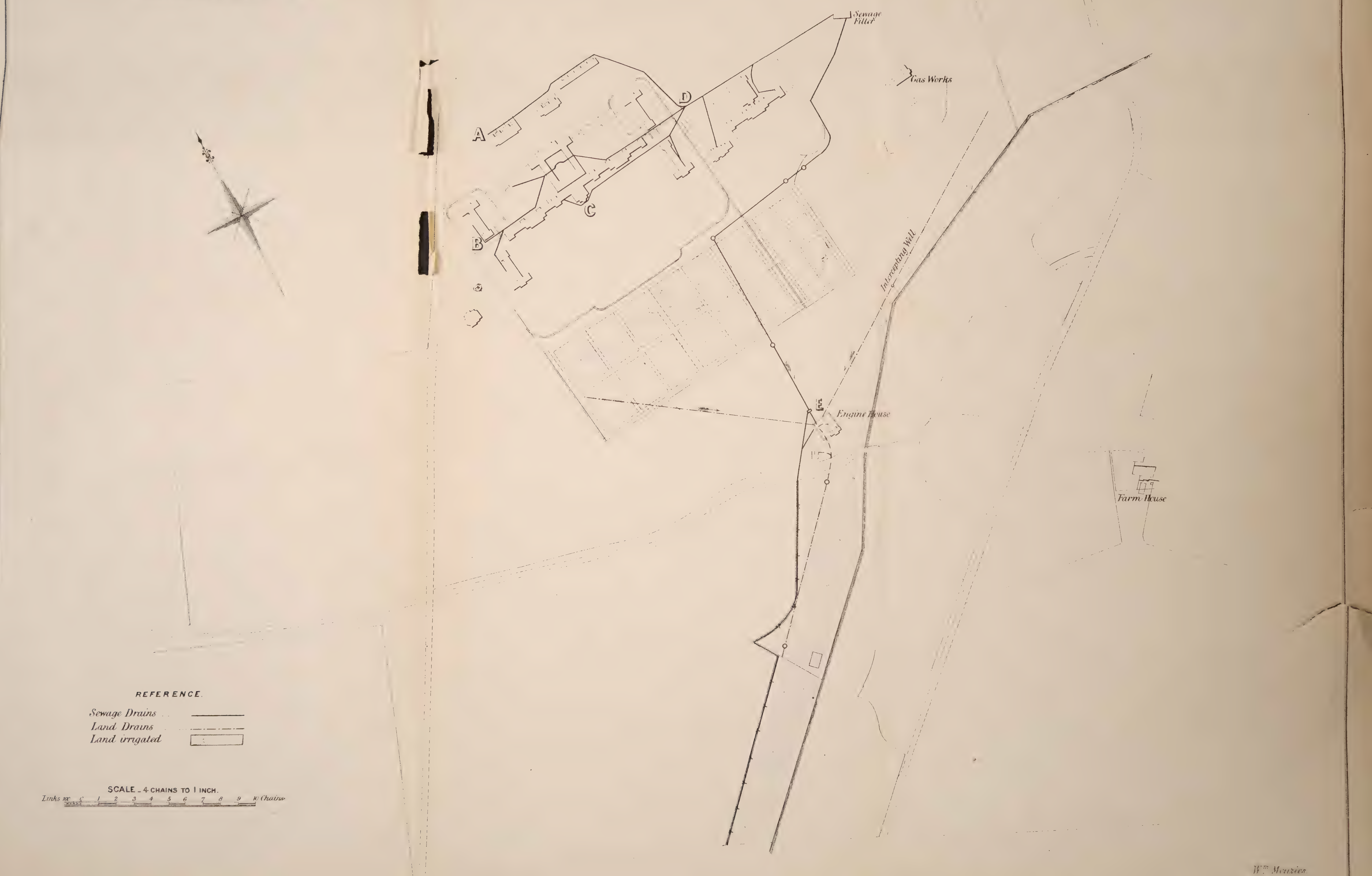
Rivers' Commission Report

Plan furnished by Wm Menzies Esqre
and referred to in his Report. Appendix No 18.

BROADMOOR ASYLUM.

PLAN.

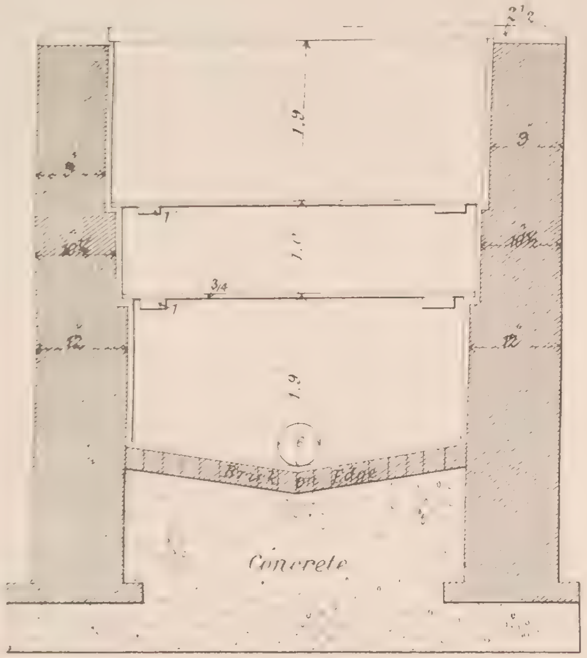
Shewing Sewage Drainage and
Land Irrigated.


Sewage Filter
Gas Works
A
B
C
D
E
Engine House
Intercepting Wall
Farm House
REFERENCE.
Sewage Drains
Land Drains
Land irrigated
SCALE _ 4 CHAINS TO 1 INCH.
Links 100 0 1 2 3 4 5 6 7 8 9 10 Chains
Wm Menzies

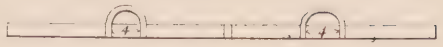
Rivers Commission Report.
Plans & Sections furnished by W. Menzies Esqre
and referred to in his Paper Appendix No 18

PLAN & SECTIONS
of
SEWAGE FILTER TANK

For a dwelling House containing about
20 Inmates. Built in the airing yards
at Broadmoor Lunatic Asylum.

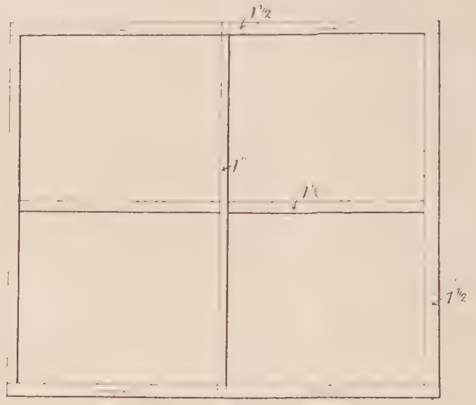

2½
1.9
9
9
10½
10½
1.0
3/4
12
12
1.9
6
Brick on Edge
Concrete

SECTION ON THE LINE C D.

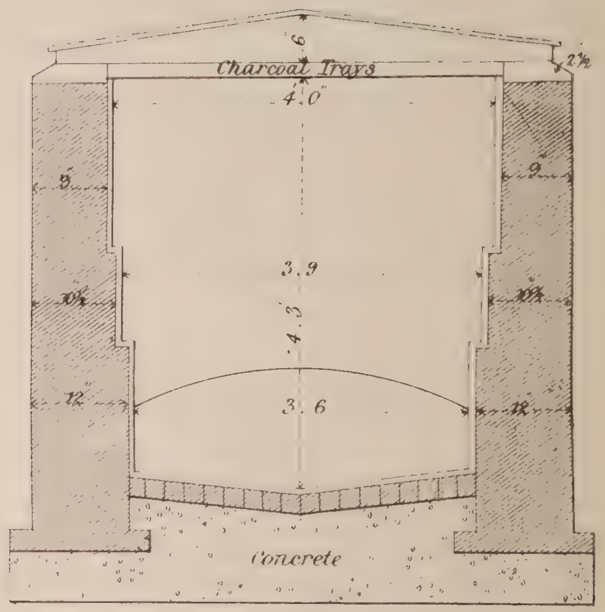


SIDE VIEW OF TRAYS

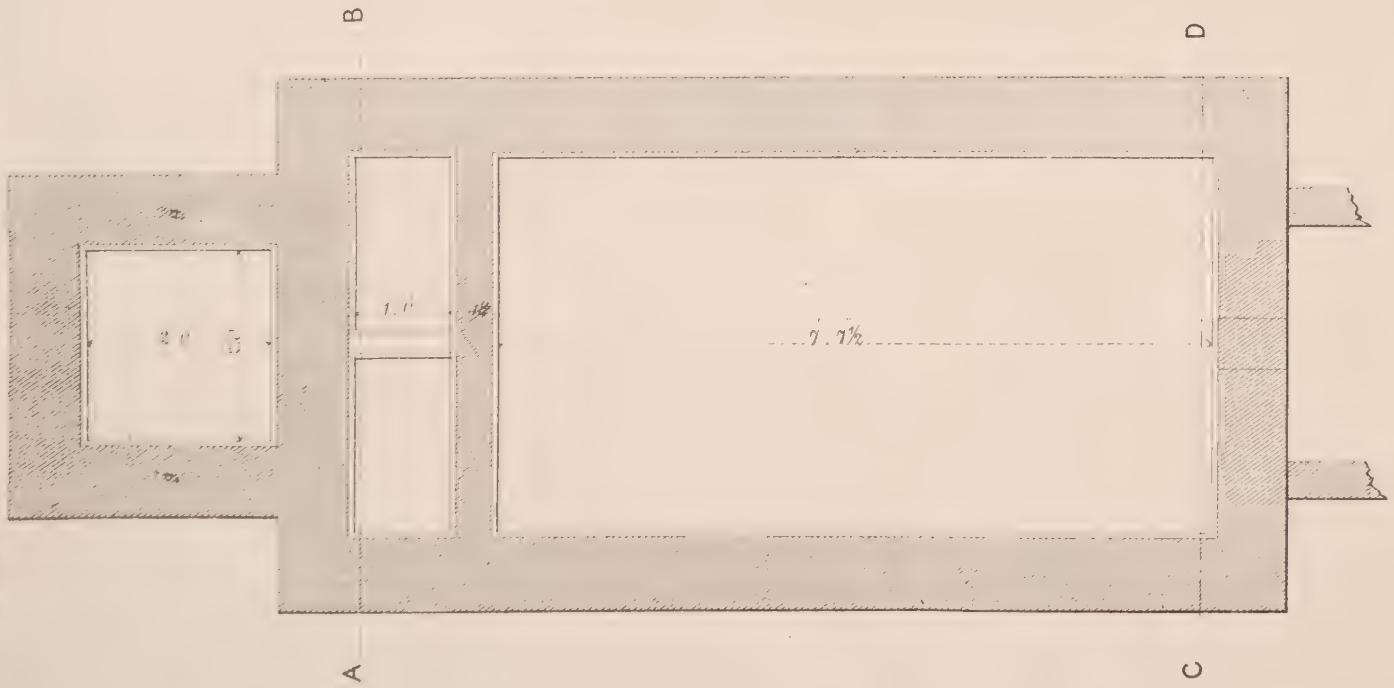
END VIEW OF TRAYS



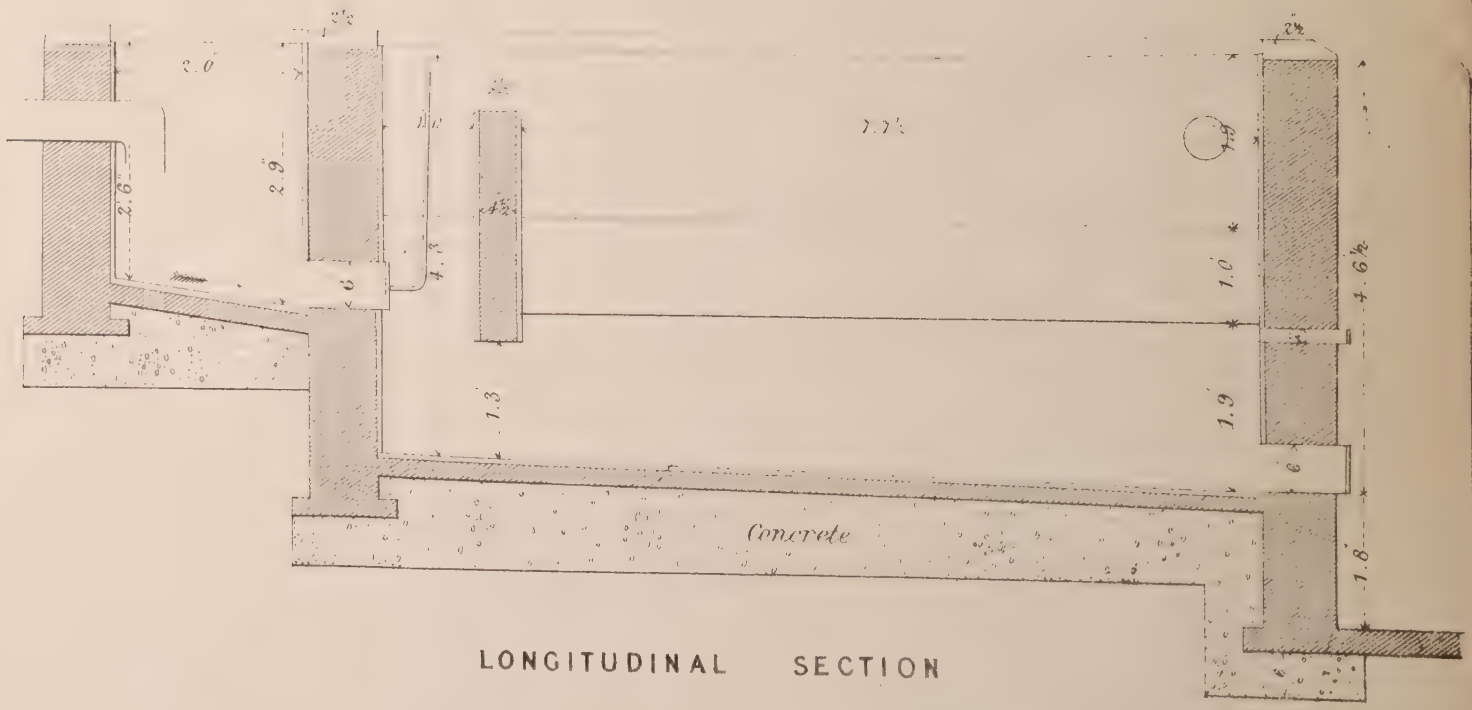
PLAN OF CHARCOAL TRAYS


6
2½
Charcoal Trays
4.0
9
9
3.9
10½
10½
4.3
12
12
3.6
Concrete

SECTION ON THE LINE A.B.


B
D
2.0
1.0
1½
7.7½
A
C

PLAN


3.0
2½
1.0
2.6
2.9
4.3
6
4½
7.7½
2¼
1.0
4.6½
1.3
1.9
6
Concrete
1.8
6

LONGITUDINAL SECTION

Scale, ½ Inch to one Foot.

Wm Menzies
9th March 1866

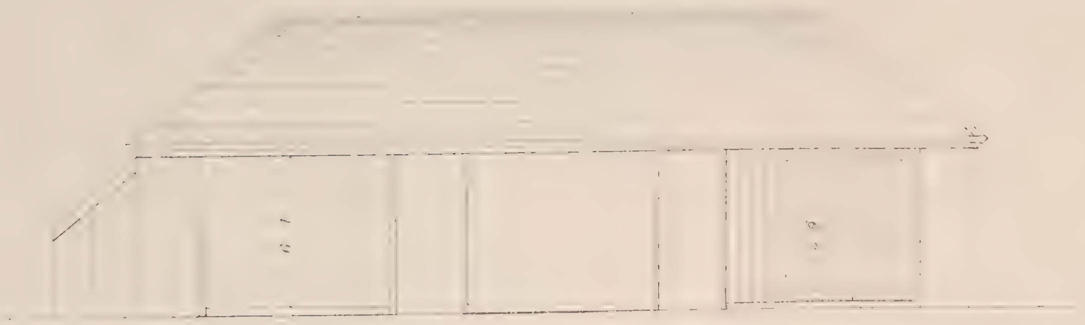
Day & Son Limited Lith.

Rivers Commission Report

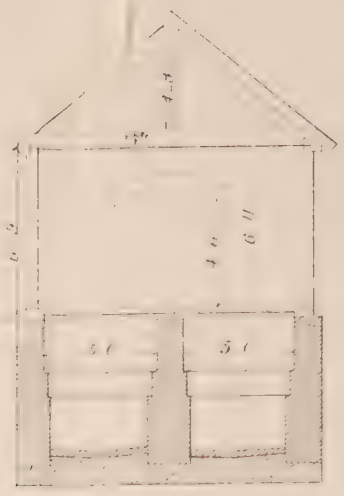
Plans and Sections furnished by W. Menzies Esqr
and referred to in his Evidence. A

BROADMOOR ASYLUM.

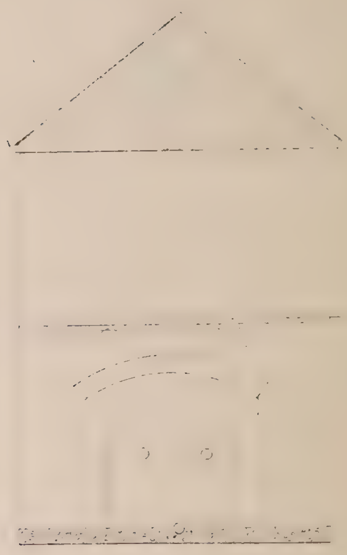
Sewage Filter Tank.



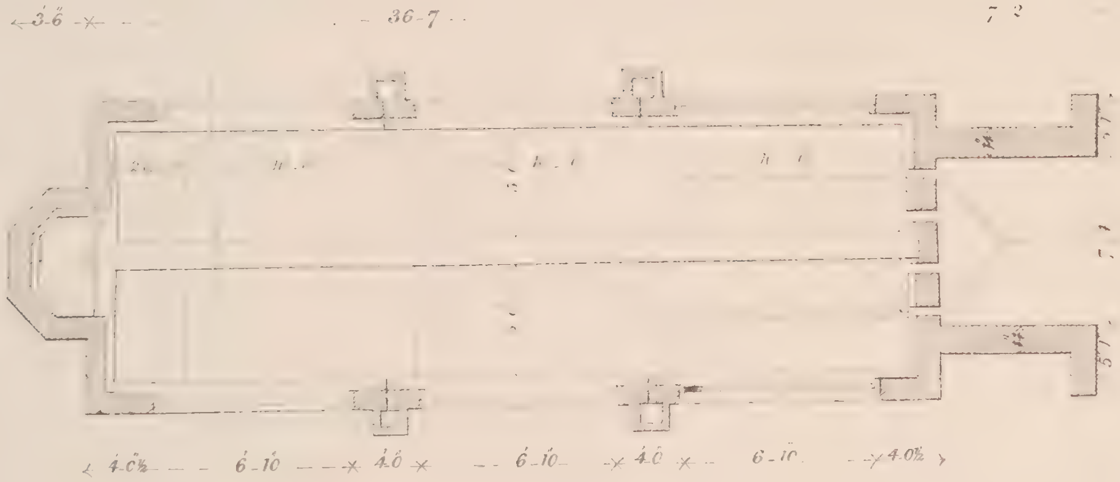
Side Elevation



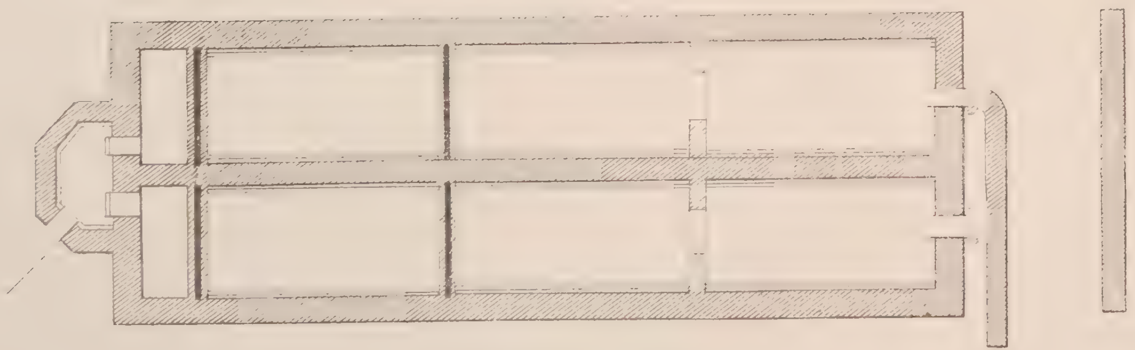
Section on line A.B.



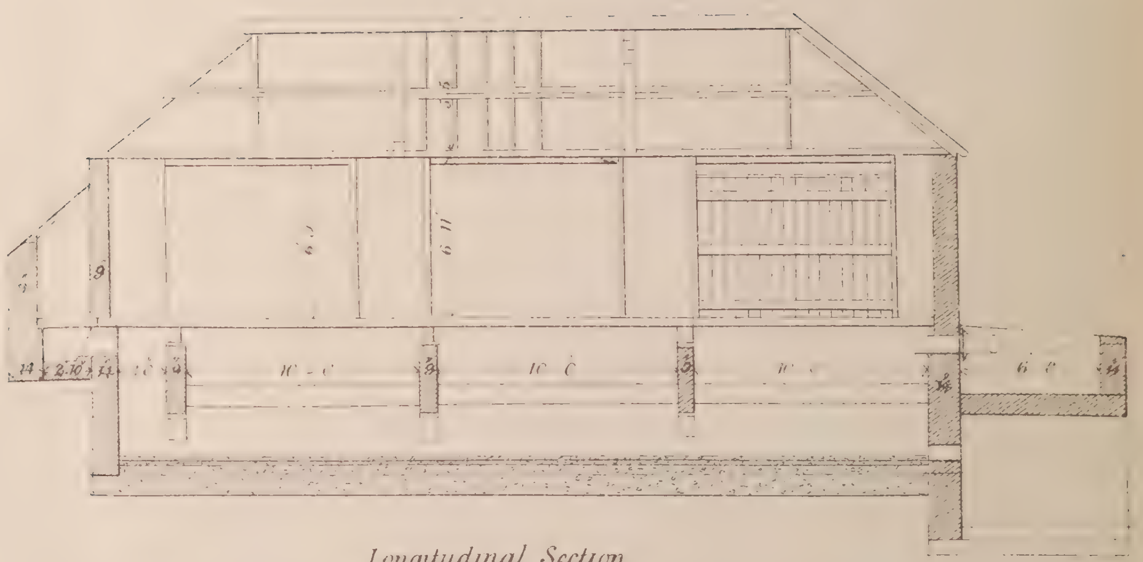
End Elevation


3.6
36.7
7.2
4.0½
6.10
4.0
6.10
4.0
6.10
4.0½

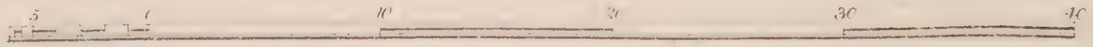
Plan



Plan shewing Trays.


10.0
10.0
10.0
6.0

Longitudinal Section



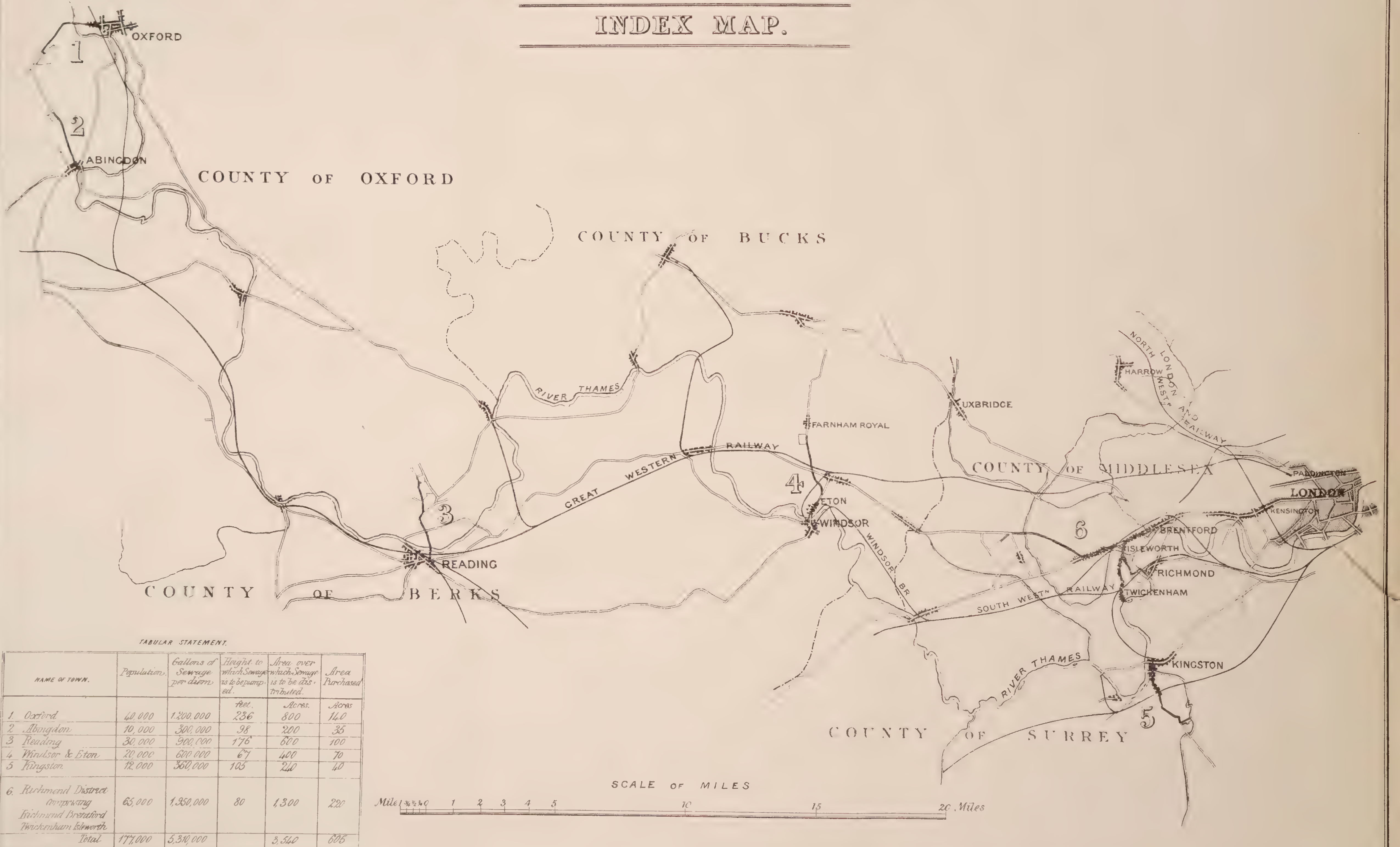
SCALE — $\frac{1}{8}$ INCH TO ONE FOOT.

Wm Menzies
9th March 1866

Rivers' Commission Report,
Map furnished by F. W. Sheilds Esq^re C.E.
and referred to in his evidence.

RIVER THAMES PURIFICATION.

INDEX MAP.


OXFORD
1
2
ABINGDON
COUNTY OF OXFORD
COUNTY OF BUCKS
RIVER THAMES
GREAT WESTERN RAILWAY
3
READING
COUNTY OF BERKS
FARNHAM ROYAL
UXBRIDGE
4
ETON
WINDSOR
WINDSOR BR
HARROW
NORTH LONDON WEST^N AND RAILWAY
COUNTY OF MIDDLESEX
PADDINGTON
LONDON
KENSINGTON
6
BRENTFORD
ISLEWORTH
RICHMOND
TWICKENHAM
SOUTH WEST^N RAILWAY
KINGSTON
RIVER THAMES
5
COUNTY OF SURREY
SCALE OF MILES
Mile 1 ¾ ½ ¼ 0 1 2 3 4 5 10 15 20 Miles

TABULAR STATEMENT.

NAME OF TOWN.	Population.	Gallons of Sewage per diem	Height to which Sewage is to be pumped.	Area over which Sewage is to be distributed.	Area Purchased
			feet.	Acres.	Acres
1. Oxford	40,000	1,200,000	236	800	140
2 Abingdon	10,000	300,000	98	200	35
3 Reading	30,000	900,000	176	600	100
4 Windsor & Eton	20,000	600,000	67	400	70
5 Kingston	12,000	360,000	105	240	40
6. Richmond District comprising Richmond Brentford Twickenham Isleworth	65,000	1,950,000	80	1,300	220
Total	177,000	5,310,000		3,540	605

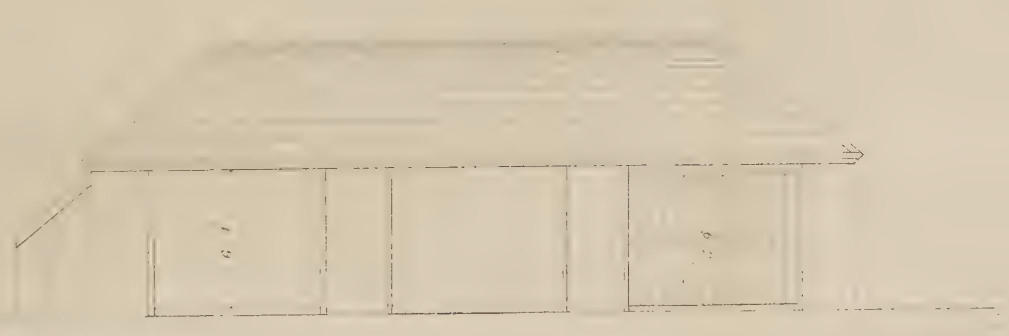
Day & Son, Limited, lith.

Prison Commission Report.

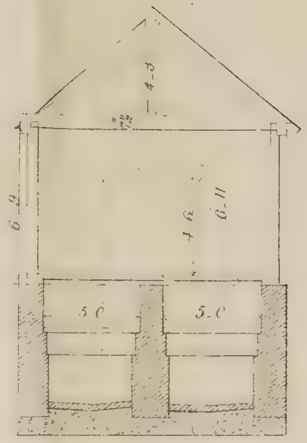
Plans and Sections furnished by Wm. Menzies Esqre.
and referred to in his Paper: Appendix No. 18.

BROADMOOR ASYLUM.

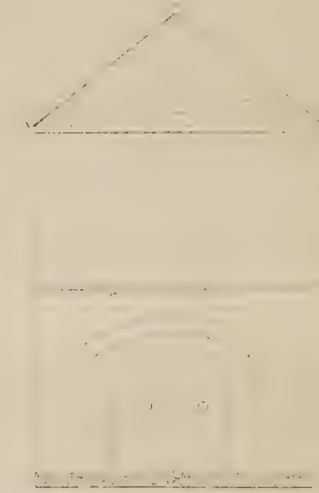
Sewage Filter Tank.



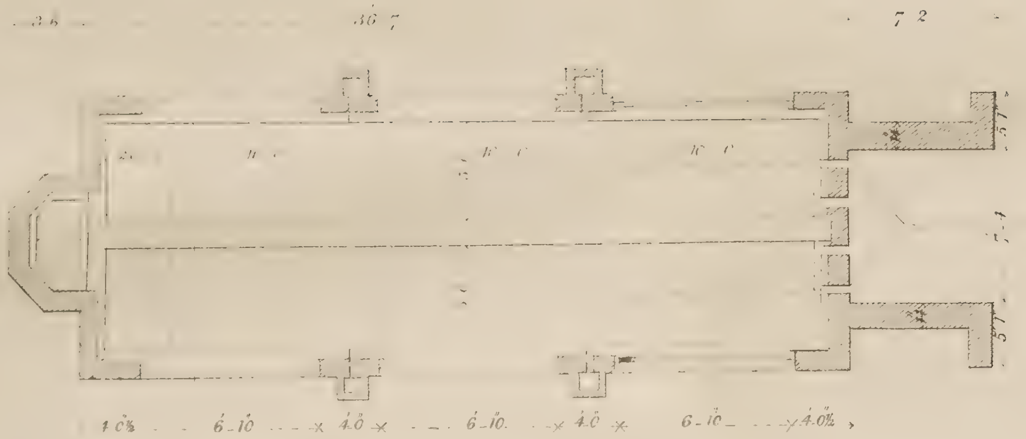
Side Elevation


4.3
6.9
4.6
6.11
5.0
5.0

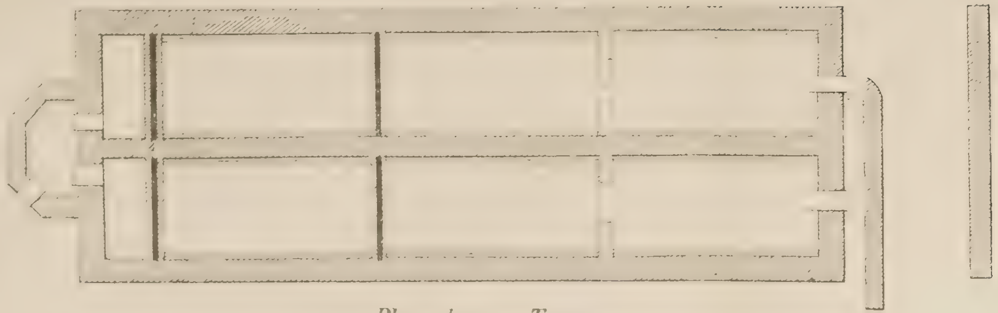
Section on line A.B.



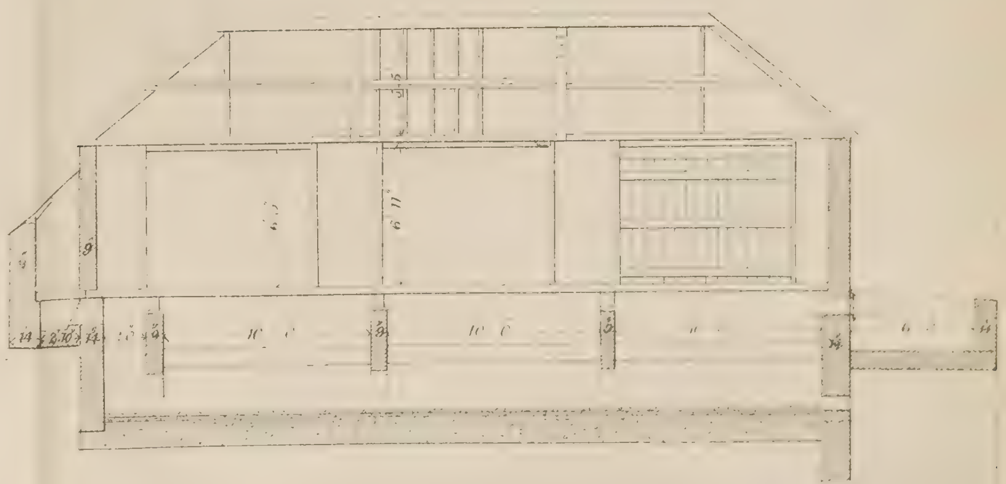
End Elevation


3.6
36.7
7.2
1.0½
6.10
4.0
6.10
4.0
6.10
4.0½

Plan



Plan shewing Trays


6.11
9
10.6
10.6

Longitudinal Section

SCALE — ⅛ INCH TO ONE FOOT.

5
0
10
20
30
40

Wm. Menzies
9th March 186

Rivers Commission Report.
Plans & Sections furnished by W. Menzies Esqre
and referred to in his Paper Appendix No 18

PLAN & SECTIONS
of
SEWAGE FILTER TANK

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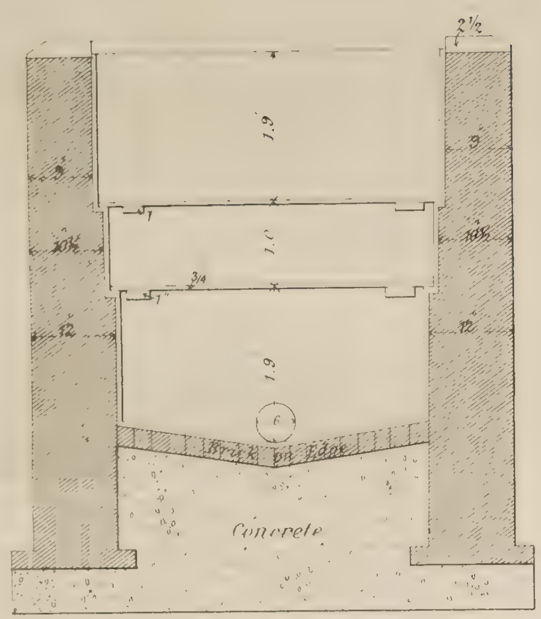
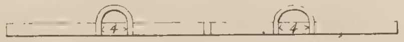
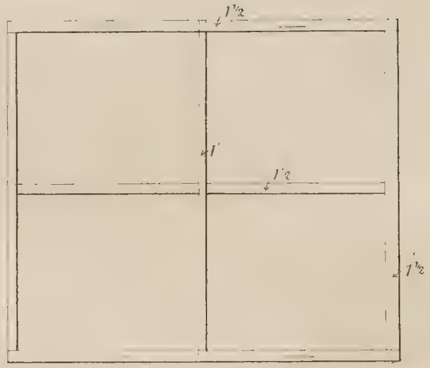

2½
1.9
9
10½
1.0
1
3/4
1
12
1.9
6
Brick on Edge
Concrete

SECTION ON THE LINE C D.

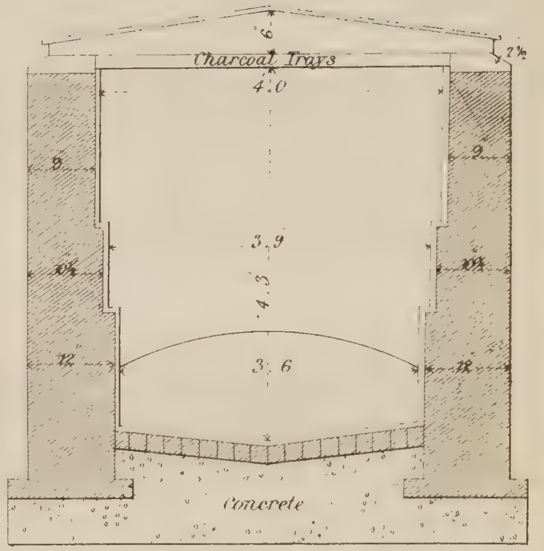


SIDE VIEW OF TRAYS

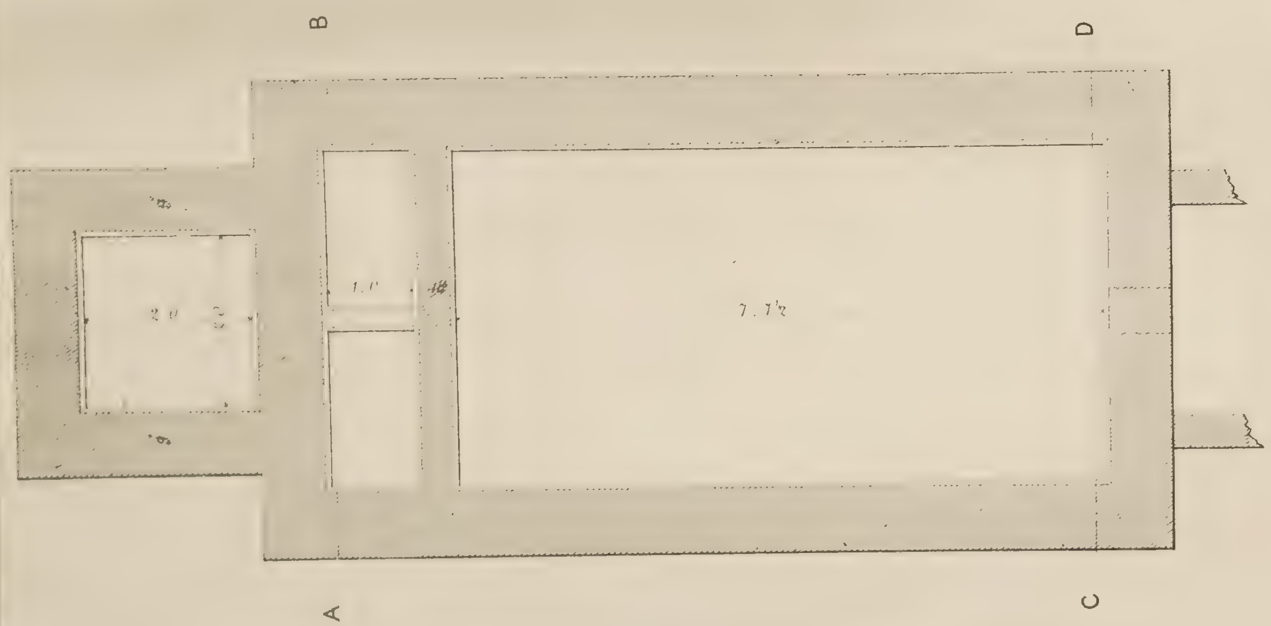
END VIEW OF TRAYS



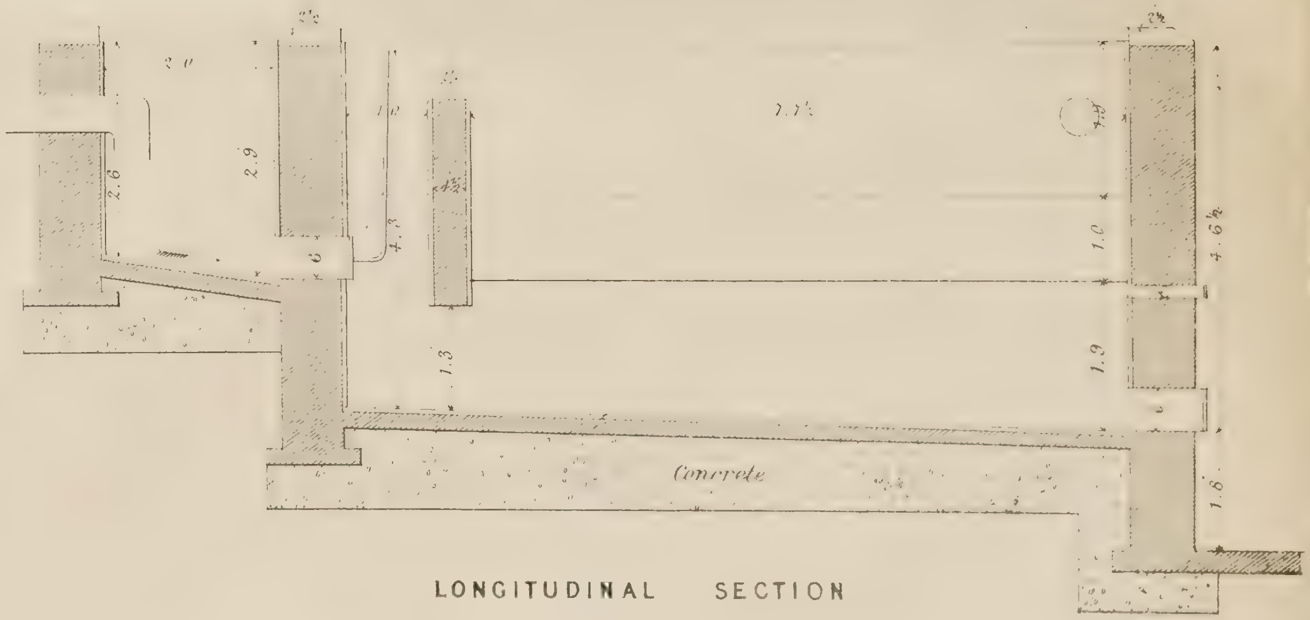
PLAN OF CHARCOAL TRAYS


6
Charcoal Trays
2½
4.0
9
3.9
4.3
10½
3.6
12
Concrete

SECTION ON THE LINE A.B.

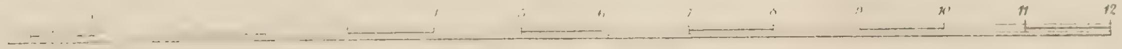

B
D
9
2.0
1.0
4½
7.1½
9
A
C

PLAN


2.0
2½
2.6
2.9
1.0
4.3
6
4½
1.3
7.1½
1.0
4.6½
1.9
1.6
2½
Concrete

LONGITUDINAL SECTION

Scale, ½ Inch to one Foot.

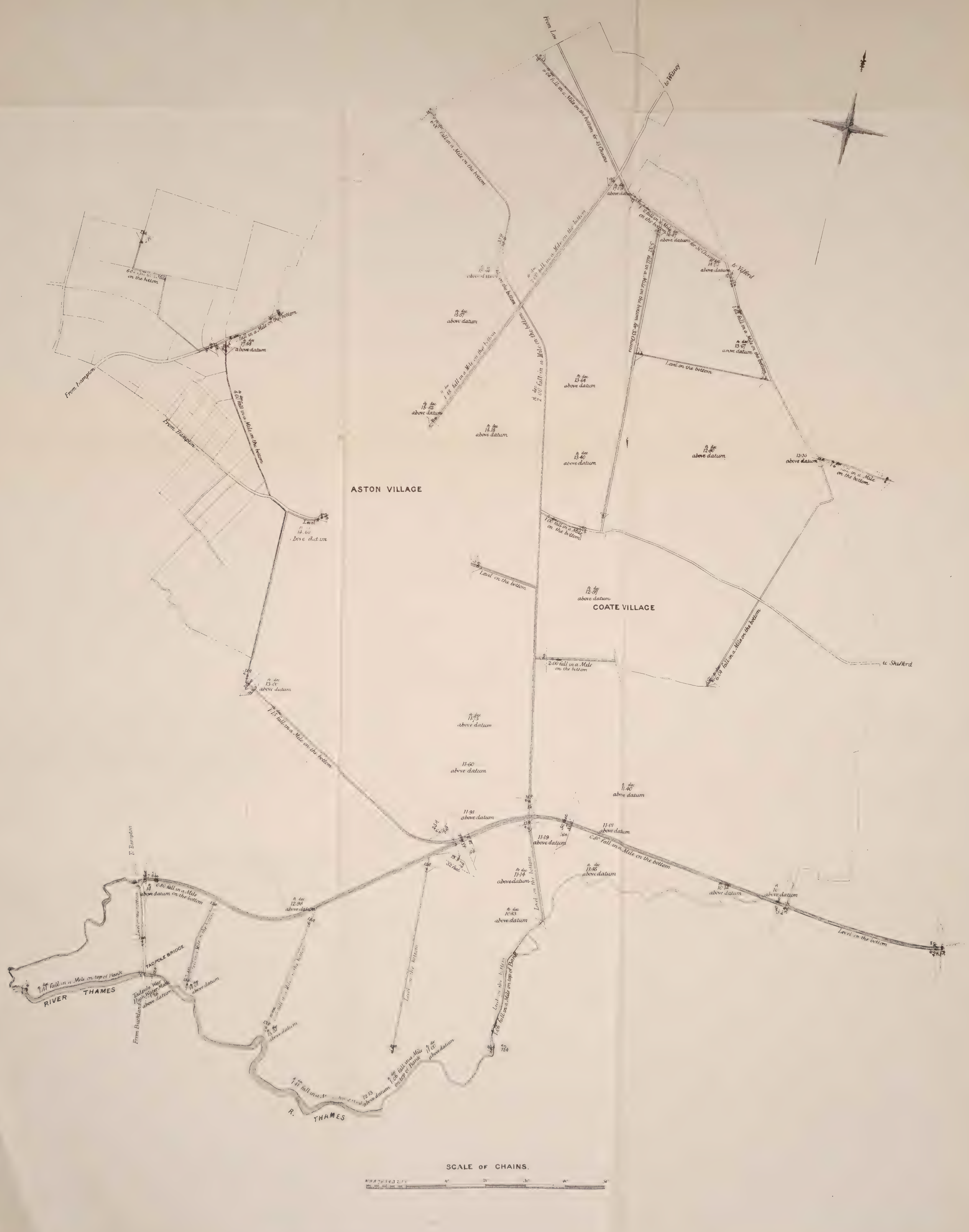

1
2
3
4
5
6
7
8
9
10
11
12

Wm Menzies
9th March 1866

Rivers Commission Report.
Furnished by William Bryan Wood Esq.^re and referred to in his Paper Appendix No. 12.

BAMPTON AND SHILTON INCLOSURE

PLAN AND SECTIONS OF DRAINS AND EMBANKMENTS.



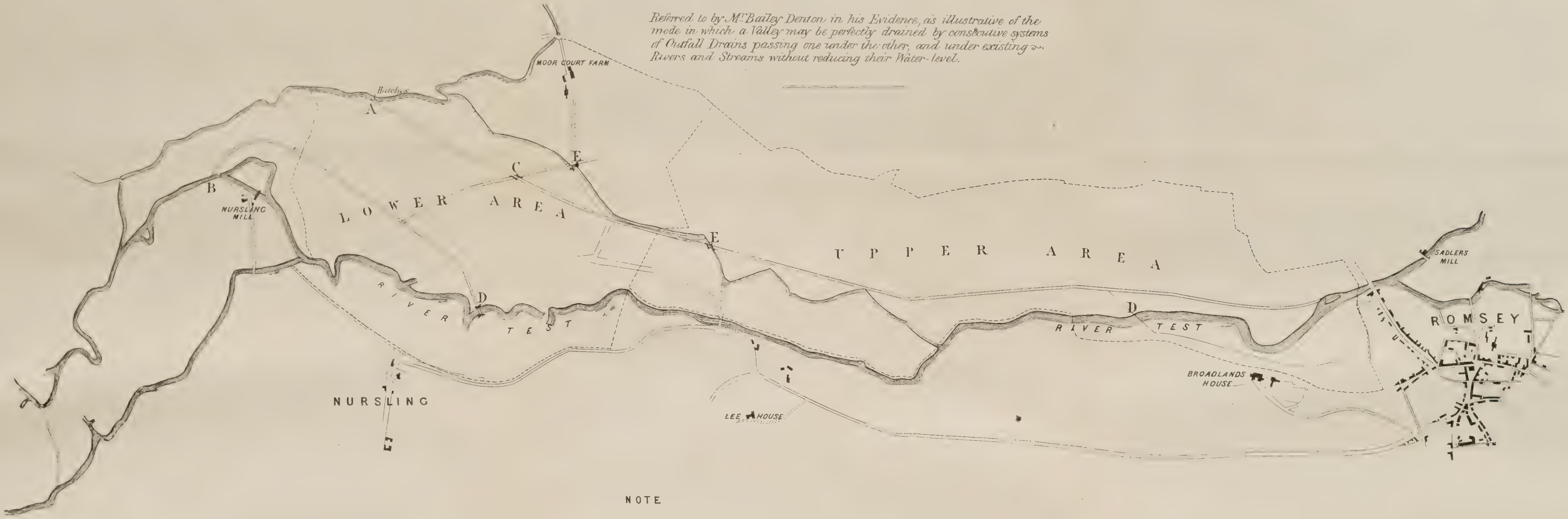
From Lew
to Witney
9.04 fall in a Mile on the bottom for 45 Chains
17.19 above datum
1.8 fall in a Mile on the bottom
16.87 above datum for 30 Chains
to Yelford
14.95 above datum
5.32 fall in a Mile on the bottom for 33 Chains
1.62 fall in a Mile on the bottom
13.67 above datum
Level on the bottom
fall in a Mile on the bottom
2.00 fall in a Mile on the bottom
1.48 fall in a Mile on the bottom
15.57 above datum
15.62 above datum
14.18 above datum
13.64 above datum
13.40 above datum
12.80 above datum
13.35 above datum
1.6 fall in a Mile on the bottom
1.00 fall in a Mile on the bottom
From Bampton
6.04 fall in a Mile on the bottom
fall in a Mile on the bottom
17.48 above datum
4.60 fall in a Mile on the bottom
From Bampton
Level
14.60 above datum
ASTON VILLAGE
Level on the bottom
13.37 above datum
COATE VILLAGE
2.00 fall in a Mile on the bottom
6.08 fall in a Mile on the bottom
to Shilford
13.00 above datum
7.15 fall in a Mile on the bottom
11.75 above datum
11.60 above datum
11.40 above datum
11.91 above datum
32 feet
11.19 above datum
11.01 above datum
0.80 fall in a Mile on the bottom
11.14 above datum
11.46 above datum
10.83 above datum
Level on the bottom
10.14 above datum
above datum
Level on the bottom
To Bampton
0.80 fall in a Mile above datum on the bottom
Level on the bottom
12.98 above datum
TADPOLE BRIDGE
1.41 fall in a Mile on top of Bank
RIVER THAMES
From Buckland
Tadpole Weir High Water Mark 14.26 above datum
14.07 above datum
fall in a Mile on the bottom
13.37 above datum
Level on the bottom
1.41 fall in a Mile on top of Bank
12.13 above datum
1.06 fall in a Mile on top of Bank
11.00 above datum
Level on the bottom
1.06 fall in a Mile on top of Bank
12 ft
R. THAMES
SCALE OF CHAINS.

Day & Son Limited, lith.

Rivers Commission Report.

PLAN
Shewing so much of the
DRAINAGE WORKS IN THE VALLEY OF THE TEST
As have been executed for the late
RIGHT HONOURABLE VISCOUNT PALMERSTON

Referred to by Mr. Bailey Denton in his Evidence, as illustrative of the mode in which a Valley may be perfectly drained by consecutive systems of Outfall Drains passing one under the other, and under existing Rivers and Streams without reducing their Water-level.


MOOR COURT FARM
Hatches
A
B
NURSLING MILL
C
E
LOWER AREA
E
UPPER AREA
SADLERS MILL
RIVER TEST
D
D
RIVER TEST
ROMSEY
BROADLANDS HOUSE
LEE HOUSE
NURSLING

NOTE

A *Discharge of Upper Outfall Drain below Hatches*
B *Discharge of Lower Outfall Drain below Nursling Mill*
C *Culverts of Lower Drain beneath Upper Drain*
DD. *Culverts beneath River Test*
EE *Culverts beneath Stream*

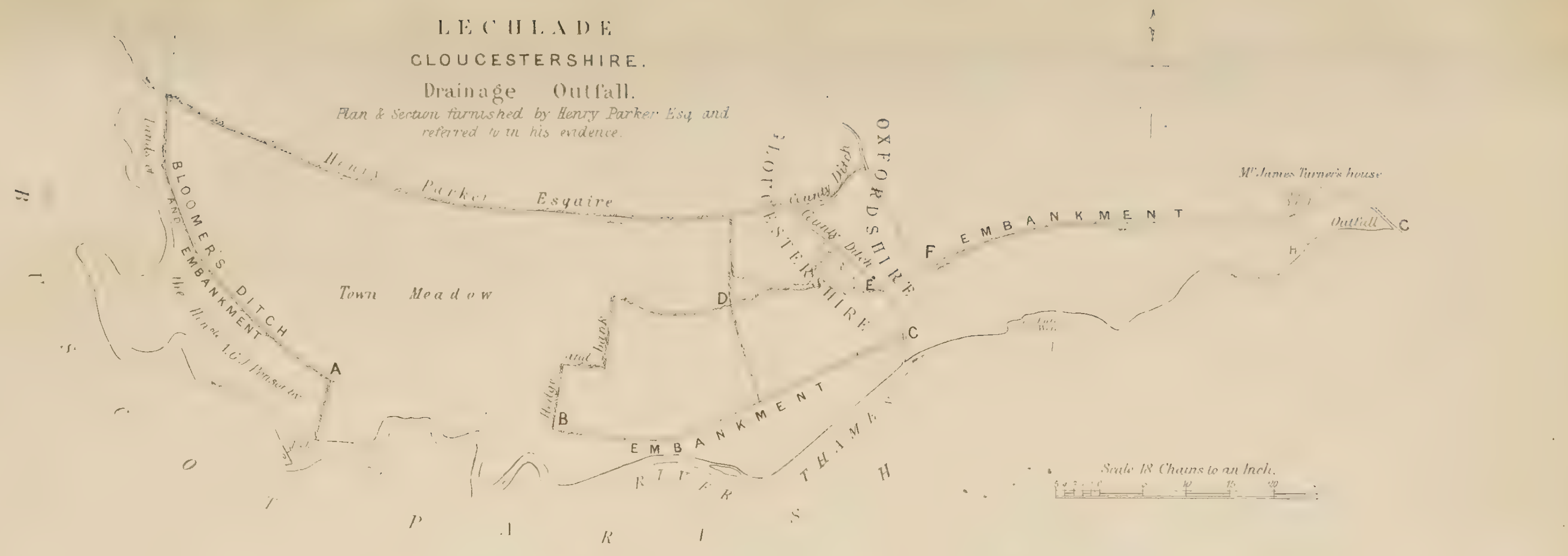
Day & Son (Limited) Lit

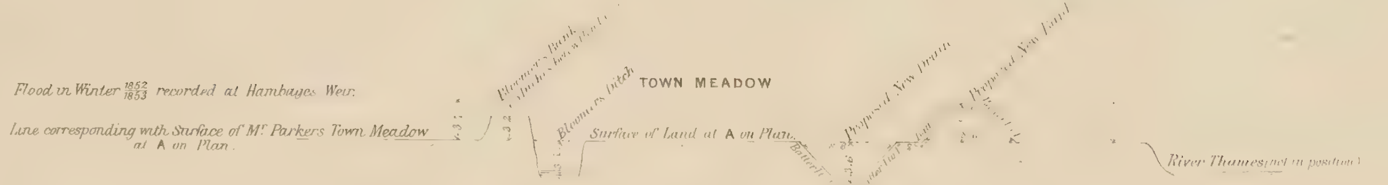
LECHLADE

CLOUCESTERSHIRE.

Drainage Outfall.

Plan & Section furnished by Henry Parker Esq and referred to in his evidence.


Lands of
BLOOMERS DITCH
AND EMBANKMENT
the Hon. L.C.J. Penser &c
A
Henry Parker Esquire
Town Meadow
Bridge
and bank
B
D
County Ditch
County Ditch
GLOUCESTERSHIRE
OXFORDSHIRE
E
C
F
EMBANKMENT
EMBANKMENT
Mr James Turner's house
Outfall
C
H
RIVER THAMES
B U S C O T P A R I S H
Scale 18 Chains to an Inch.
10
15
20


Flood in Winter $\frac{1852}{1853}$ recorded at Hambages Weir.
Line corresponding with Surface of Mr. Parkers Town Meadow at A on Plan.
Bloomers Bank
Bloomers Ditch
TOWN MEADOW
Surface of Land at A on Plan.
Batter
Proposed New Drain
Proposed New Land
River Thames (not in position)

LECHLADE GLOSTRE SECTION OF PROPOSED NEW DRAIN & EMBANKMENT IN CONTINUATION FROM BLOOMERS DITCH IN TOWN MEADOW BELONGING TO HY PARKER ESQ.

Scale 15 Feet = One Inch.

N. B. The above Section represents a Bank the dimensions and Sectional Area of which exactly correspond with those of the New Drain.
The thickness of the Bank should be governed by the quality of the Material used in its construction. If it be of a light or loose nature, it may be necessary to strengthen the Bank by adding to its River side the material could be obtained from the Town Meadow side of the New Drain, by widening it.
The depth 3ft 6in would suffice at **A**, *but it would be advisable to increase towards* **B** *to 4 ft. or 4 ft. 6 in.*

April. 3. 1862

Josiah Parkes per J. B.
11 Gt. College St. Westminster.

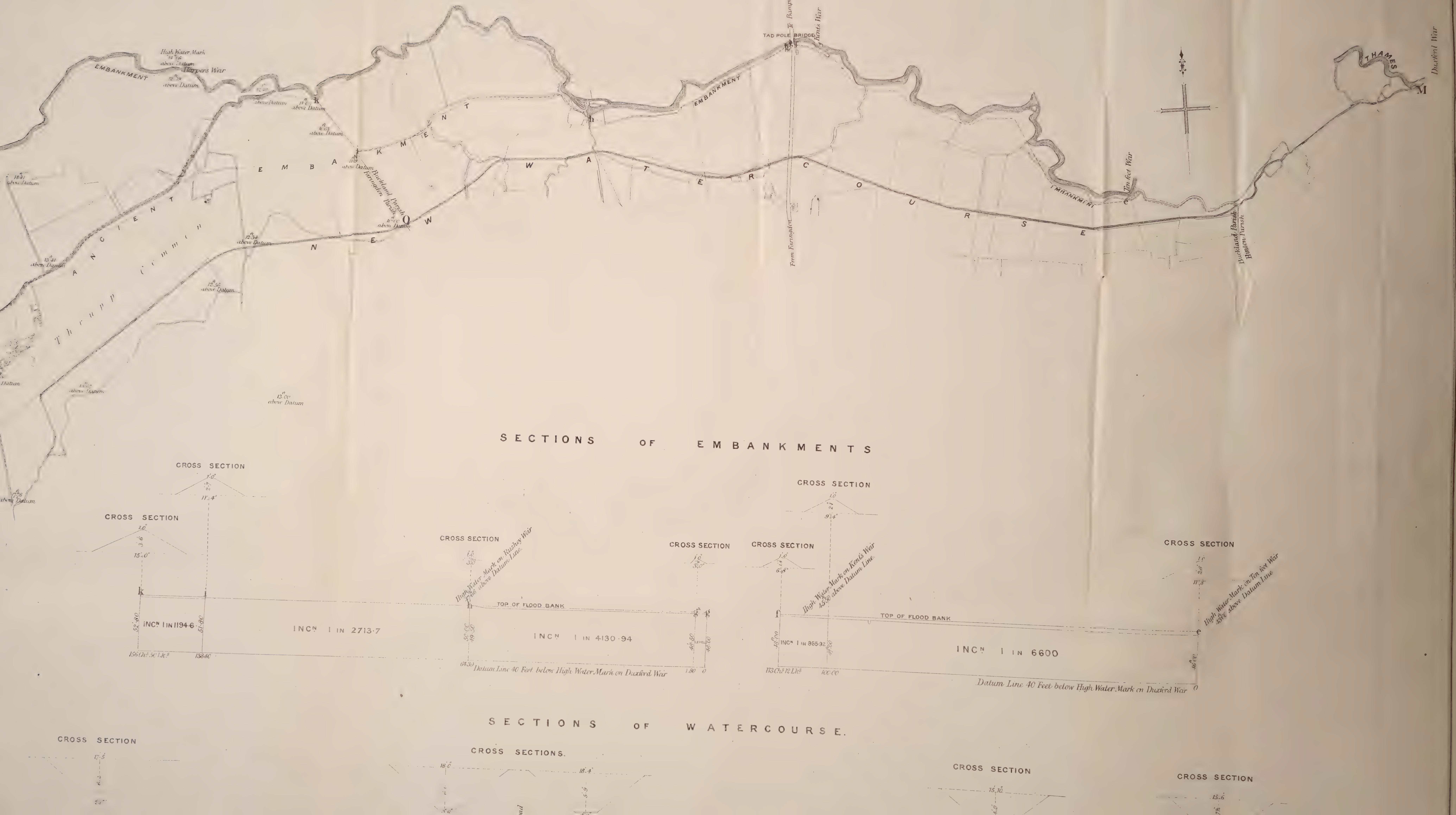
Day & Son, Limited Lith.

Rivers Commission Report

WADLEY INCLOSURE.

PLAN AND SECTIONS OF DRAINS AND WATERCOURSES.

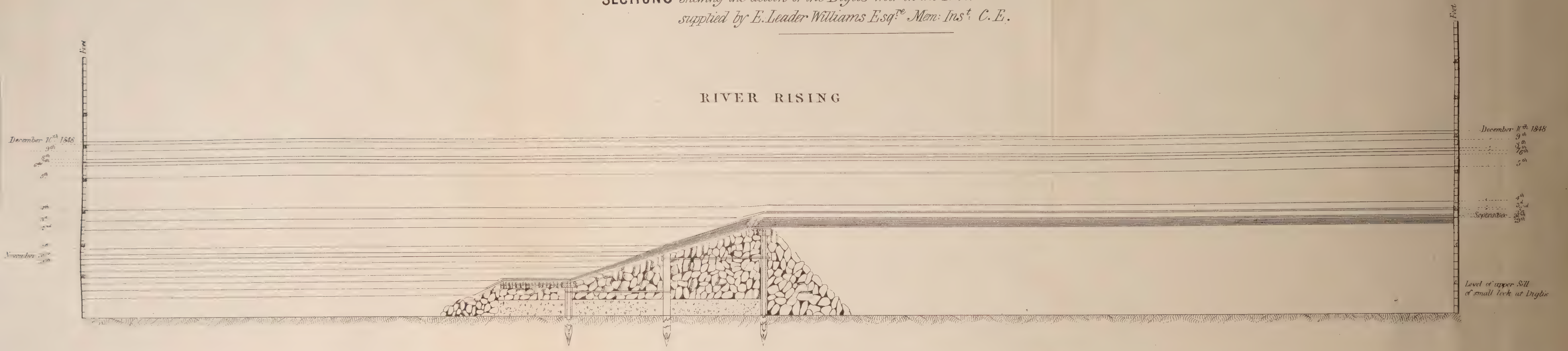
*Plans & Sections furnished by William Bryan Wood Esqre
and referred to in his Paper Appendix No 12.*


EMBANKMENT
High Water Mark
above Datum
Harpers War
above Datum
k
above Datum
TAD POLE BRIDGE
To Bampton
Kents War
From Faringdon
EMBANKMENT
h
ANCIENT EMBANKMENT
Thrupp Common
NEW WATERCOURSE
Buckland Parish
Faringdon Parish
O
EMBANKMENT
Ten foot War
e
Buckland Parish
Hinton Parish
THAMES
Duxford War
M
12.54 above Datum
12.56 above Datum
13.00 above Datum
SECTIONS OF EMBANKMENTS
CROSS SECTION
CROSS SECTION
CROSS SECTION
High Water Mark on Rushey War above Datum Line
TOP OF FLOOD BANK
INCN 1 IN 1194·6
INCN 1 IN 2713·7
INCN 1 IN 4130·94
Datum Line 40 Feet below High Water Mark on Duxford Weir
CROSS SECTION
CROSS SECTION
CROSS SECTION
High Water Mark on Kents Weir above Datum Line
TOP OF FLOOD BANK
INCN 1 IN 865·32
INCN 1 IN 6600
CROSS SECTION
High Water Mark on Ten foot War above Datum Line
Datum Line 40 Feet below High Water Mark on Duxford War
SECTIONS OF WATERCOURSE.
CROSS SECTION
CROSS SECTIONS.
CROSS SECTION
CROSS SECTION

Rivers Commission Report.

SECTIONS *shewing the action of the Diglis Weir on the River Severn supplied by E. Leader Williams Esqre. Mem: Inst. C.E.*

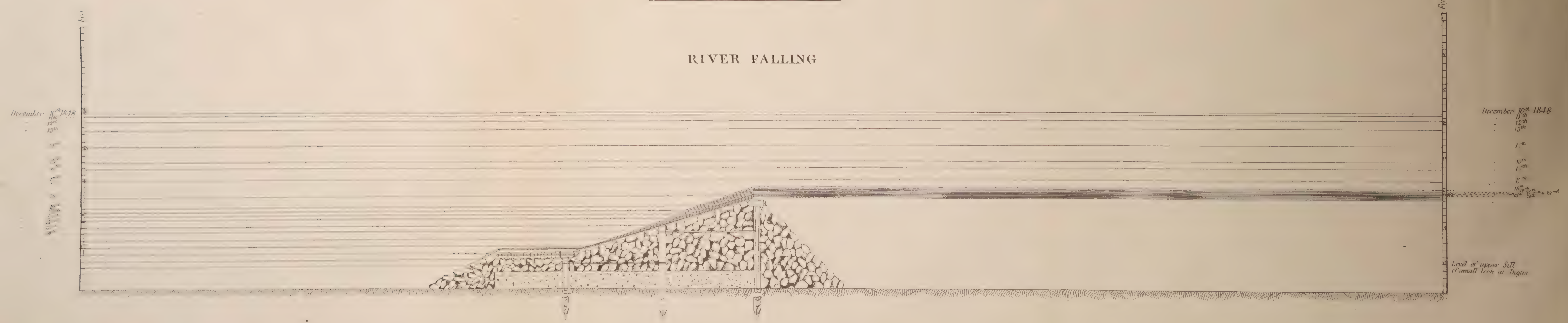
RIVER RISING


Feet
December 10th 1848
9th
8th
7th
6th
5th
4th
3d
2nd
November 30th
29th
Feet
December 10th 1848
9th
8th
7th
6th
5th
4th
3d
2nd
September 30th
29th
Level of upper Sill
of small lock at Diglis

HORIZONTAL SCALE OF FEET

5 4 3 2 1 0 5 10 15 20 25

RIVER FALLING


Feet
December 10th 1848
11th
12th
13th
Feet
December 10th 1848
11th
12th
13th
14th
15th
16th
17th
18th
19th
20th
21st & 22nd
23d
24th
Level of upper Sill
of small lock at Diglis

Day & Son London Lith

FIRST REPORT

OF

THE COMMISSIONERS

APPOINTED TO INQUIRE INTO

THE BEST MEANS OF PREVENTING THE POLLUTION OF RIVERS.

(RIVER THAMES.)

Vol. II.

MINUTES OF EVIDENCE AND INDEX.

Presented to both Houses of Parliament by command of Her Majesty.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1866.

14153.

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MINUTES OF EVIDENCE

TAKEN BEFORE

THE COMMISSIONERS

APPOINTED TO INQUIRE INTO

THE BEST MEANS OF REMEDYING THE POLLUTION OF RIVERS.

Oxford, Tuesday, 31st October 1865.

PRESENT :

ROBERT RAWLINSON, Esq., IN THE CHAIR.
JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.
GODFREY LUSHINGTON, Esq., Secretary.

The Rev. JAMES CHARLES CLUTTERBUCK, M.A., of Long Wittenham, Abingdon, examined.

OXFORD.
Rev. J. C. Clutterbuck, M.A.
31 Oct. 1865.

1. (*Chairman.*) Are you able to describe briefly the geological character of the upper valley of the Thames ?—I will refer you to this paper which was laid before the Institution of Civil Engineers, but I will state its substance briefly. The river Thames runs almost from its sources, in the Cotswold Hills, over the Oxford clay. These hills consist of a group of oolitic strata which vary exceedingly in their conformation. There is also another source of perennial water to the Upper Thames, viz., the Chalk-hills to the south of the valley of the Thames. Thames Head is supposed to be the source of the river Thames ; but it so happens that there is a pumping engine established close to that spot by which water is raised to carry on the navigation of the Thames and Severn Canal ; in consequence of that there is a very great defalcation, and nearly a cessation of water from that which might have been originally a source of supply. We next come to the river Churn. It flows from oolitic strata. It would have been very much affected if the scheme for supplying Cheltenham with water had been carried out. Then come the rivers Coln, the Leach, the Windrush, the Evenlode, and the Cherwell, which all more or less derive their water from the same sources, the oolitic strata. Of course there is no perennial source of water from the Oxford clay. The river Ray, which falls into the Cherwell, almost entirely derives its water, such as it is, from the drainage of the Oxford clay about Otmoor, and there is a small perennial supply coming down from Bicester. With reference to the southern feeders of the Thames, the water comes down the river Ray, the Coln, and the Ock, more or less from chalk strata to the south. The chalk stratum is above the greensand. That is a general view of the sources of the water above Oxford.

2. In what formation is Thames Head ?—In the oolitic formation.

3. You get the oolite, Oxford clay, and chalk ? —You get the oolites to the north. Water from the oolites, although perennial, is also often reduced very much by drought. My observation has been that it takes at least 2½ inches of rain to replace the evaporation of a summer like this.

4. Evaporation and the pull upon the springs ? —The evaporation from the surface. The pull upon the springs does not depend upon the evaporation of the surface. The two things must be very carefully distinguished. We have had a very dry September, as everybody knows. In some places they absolutely did not note a single drop of rain. The total I myself noted in September was under the tenth of an inch— a most unusually small rainfall for a calendar month. Very recently I went, by Mr. Campbell's invitation, to look at his works at Buscot. At that time we had had about 2½ inches of rain, and I said to him, "According to my calculation, your drains ought to "begin to run now." The whole of his estate is on the Oxford clay. The drains are 4-feet deep and very well executed. We went out and found these drains just beginning to run. He wrote to me immediately after that and said that the ponds which he has there were then full and overflowing. In some places in the north, near Liverpool, I have been informed that one-half of the whole rainfall is collected and stored in reservoirs. I have seen a calculation of Mr. Baldwin Latham's to that effect. Of course under such circumstances 2½ inches of rainfall would have much less effect in producing floods than the same quantity falling here. This is worthy of note, because such examples from northern areas have been rather thrown in my teeth. I never knew so much rain fall as has fallen lately with so little flood. The first reason for that is, of course, the condition of the ground when the rain fell. Another reason is the quarter from which the rain came. The first gush of rain, almost the first three inches, came from the north and the north-east, not from the west. It is easily understood that the easterly winds bring more rain to the eastern counties, and the westerly bring more to the western counties. Here in Oxford we have a mean. But everybody who is at all acquainted with the river knows that the westerly rains bring us more flood. The six inches of rain, therefore, which are recorded to have fallen at Oxford this month, coming as they did from the north and north-east, would be, perhaps, equivalent only to four inches of rain, all from the west. It is an exceedingly difficult thing to calculate beforehand

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Rev. J. C. Clutterbuck, M.A.

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the coming of a flood, unless you have a very large number of rain gauges to consult. One of the things which might be done, and ought to be done, if this river is to be maintained as a navigable river and with proper reference to the agricultural value of the land upon its banks, is that there should be rain gauges. Some people pooh pooh rain gauges, but I do not. Rain gauges should be kept at various stations, and there should be a person at some central point, such as Oxford, who might be enabled to issue his orders to the different persons in charge of the locks, and say, "Now you are to draw up all your "tackle." I know that they have to take care of the water and not to let it down too fast, but as a general rule I think that the water is penned back. The millers are anxious to keep up the head. They do not care for the tail at all, and they will keep the water away from the tail as well as they can. In consequence there has been more flooding than there need be. I do not think that you will ever do much good till you have a much more stringent regulation of the water. If one is to believe report, there has been a great deal of tampering with what are called the high-water marks. That is most destructive.

6. Do you mean that the millers have from time to time tampered with their dams and raised them?—I do not say that they have done so, but I know that they have the credit of it. Then there is another point, namely, the insufficient waterway in many places. Take Sandford, for instance, and compare it with Day's lock. A narrower waterway of greater depth, I know, will relieve a head of water better than a wider waterway at a less depth; but estimating in square feet, without reference to construction, there is a great deal more than double the waterway at Day's lock than there is at Sandford, just below here. Dr. Buckland said, that he could drown Oxford, if he had the command of the narrow channel at Sandford. The difficulty of drainage at Sandford has been a little overstated. It has been generally supposed that because the valley is very narrow at Sandford, therefore, of necessity, there are obstacles to the drainage of this part of the country. But, if you go below Sandford, you have just the same physical condition all the way. At Clifton-Hampden the physical condition is much worse. I came by it to-day. The water was running at about 80 yards per minute, the tackle being up, (contrasted with its ordinary pace of 50 when the tackle is in), but all the water was running within the banks; there was no flood, except a little here and there. It is true nature has given a large fall there,—it is where the strata come in and crop out over one another; but there is also a very large fall at Sandford, and if the best was made of that fall, there is no doubt that the flood water in Oxford would be abated very much sooner; there is a gathering of the water on the surface of the meadows there which might at any rate be relieved. I believe that a plan, such as has been adopted at Port Meadow, might relieve all the meadows below Oxford, and certainly those above Oxford—I mean the plan of cutting drains in proper directions close by the side of the valley and parallel to it.

7. (*Mr. Harrison*). Is the bank adjoining the river higher than the land at a little distance from it?—Yes, that is universal.

8. (*Professor Way.*) That is produced by flooding?—Yes, because the heavier silts are deposited on to the banks. You cannot drain the meadows to any depth, at a few feet below the surface you come upon a bed of gravel which is really the gravel bed of the river. This gravel bed is waterlogged, and of course you cannot drain it without draining the river itself. The surface is the silt, made up of the washings down from generation to generation of the deposit of the floods. Here and there, where it has been deposited immediately out of the river, you will find it more gritty, and *vice versâ*, the most tenacious portion of that silt warp will be at the greatest distance from the actual river. By cutting proper drains you will be able to get rid of the water which stagnates and festers upon the surface. Take Christchurch meadow: I do not see why Christchurch meadow should ever have a drop of water upon it, except at a very high flood. I think the overflow from the river might be banked out there, and any surface water might be carried under the Cherwell, along under the bank upon which the new town Cowley is standing, and then by some simple contrivance carried by pipe under the head of the river somewhere near Iffley. It is the stagnant surface water which is so injurious to health, and I think that you might get rid of the whole of that.

9. (*Mr. Harrison.*) You have said that the substratum is gravel, do you know that?—I am certain of it. You may see the substratum very well at what is called the Railway Lake, from which Oxford is supplied. It has always occurred to me that in carrying out the drainage of Oxford care should be taken not to cut through the stratum of gravel between the Railway Lake and the river, lest any injury be done to the water supply of the city. When once you interfere with a stratum regularly and steadily yielding water you do not know what diversion of water from the stream may take place. The Railway Lake is the source from which the waterworks supply the city. I prefer that water to the well water of Oxford—I think it purer. I know that a great deal of the well water of Oxford is very flat and disagreeable. I think that the Oxford water will be found to be exceedingly impure in the wells, much more so than people are aware of; and one of the great things for the sanitary condition of Oxford is to do everything to keep up that supply of water which is pumped up and delivered in the regular service of the town. Now if you cut any deep channels through the gravel I think that you would endanger that water supply. I would rather trust to a shallower drainage which should command all the surface drainage. You cannot get rid of the water underneath.

10. Do you know what depth of silt there is before you come to the gravel?—It varies exceedingly, but I should think, as a general rule, about three feet. It is possible that in some places the silt, from having been brought down over clay strata, may have sufficient clay in its composition to resist the pressure of the water from the gravel, so as to prevent its rising. There might be occasionally something like a little Artesian well.

11. What is the character of the gravel?—It is oolitic gravel. You will find it vary in its constitution, because it has picked up the débris of the different strata over which the water has passed. Coprolites, for instance, which lie between the gault clay and the lower greensand, you will find in the gravel in the lower part of the river in much greater quantities than above. On the other hand, if you go further up you will find nothing but the oolitic débris. I went to Thames Head when the water was very low, and all down those meadows where the branch line from Cirencester to Kemble crosses the little streams there is nothing but oolitic débris. That may be said to be the normal state of the gravel.

12. (*Professor Way.*) In dealing with Oxford you would say that the gravel which lies below the silt is part and parcel of the natural bed of the river itself, and therefore is not to be touched?—Certainly.

13. But the portion above it is what you would relieve of water?—Certainly.

14. By drains?—Yes, and all those carriers which connect transversely with the river should be entirely stopped up.

15. Could not embankments be made to confine the water to the river bed, so as to relieve the meadows altogether of flood?—You must let the flood have its own way to a certain extent. It must have a larger course to run over than the bed of the river itself. I am now speaking not of how to prevent floods, but only of how to get rid of the residuum of floods, of the water left stagnant. Thus immediately above Sandford lock I see a stagnation of water. It is very natural that it should be thus, for the land is very low;

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but if those meadows were banked, and an iron pipe laid down under the river to carry off the water to a lower level, the evil would be remedied. It is not at all a difficult question to deal with the stagnant water—it is only matter of drainage. When this stagnant water was gone, there would be no more till the next heavy rain.

16. (*Chairman.*) You mean that the volume of water which really causes the nuisance is insignificant?—It is utterly insignificant.

17. And it is simply the mal-arrangement under which the lands now exist which allows that water to remain and stagnate there?—That is exactly the case. That is my impression, and one which is not hastily formed or theoretical, but proceeds from what I have seen.

18. With regard to parallel embanking, I suppose you are aware that the velocity in the main current is increased with every fraction of head which you put upon the river?—Of course.

19. And therefore, if you narrowed the channel by raising embankments on either side, and so lifted the river six or eight inches, or up to a foot, you might get a discharge of a greater volume of water than that which now flows over on the land and does the mischief?—Yes.

20. (*Mr. Harrison*). But at present these embankments are being made partially by individuals?—Yes.

21. They necessarily raise the water higher; are they not therefore an injury to the lands both above and below, and should not, therefore, any system of embankment be rather carried out as a whole?—Decidedly; but I think self-protection would come in there. At Chimney I met with a man on the banks of the river who had suffered from floods to the extent of losing his first crop of hay; it had either been carried away or had been so silted with the flood that it was utterly valueless. Then I happened to meet with Mr. Bryan Wood, and he referred me to a person who showed me over two or three of the farms immediately above, and said, "We were carrying our hay " when the water was running at a level above our " meadows, and we saved it all." There was the difference between where the land was treated with these embankments and where it was not.

22. (*Chairman.*) I suppose that we should have to do in the case of these low-lying lands something similar to what has been done upon an enormous scale in Holland?—I am not acquainted with that.

23. (*Mr. Harrison.*) Is there not another way in which the evils of floods may be avoided, namely, by deepening the channel?—Yes.

24. The channel of the river is claimed by the owners of the land adjoining, is it not?—Yes, halfway each side.

25. Are the owners of the property on each side in the habit of rather encouraging than otherwise the formation of what they call flams?—Yes; I think that they very often do encourage, by the growth of osiers, and so on, the detours and the altering of the course of the river, and to a certain extent the obstruction of the stream.

26. Should they not be prevented from doing so?—From the nature of the banks it would be very difficult indeed to prevent the disintegration which is perpetually going on. The stream impinging upon the banks washes out the sand and gravel underneath. What generally happens is this—the face of the bank dries in the summer when the water is very low; then comes what is called a flash, which raises the water perhaps two or three feet; it necessarily comes down with a greater volume and a greater stream; it washes away the sand and gravel from underneath, and of course the next thing is for the silt which is above to fall in. In this way I have known of places where, within thirty years, acres of land have exchanged owners. There is a place which is now used for growing osiers which, when I first took to the land, which was about ten years ago, was only a bank where I have landed occasionally when the water was very low; now it stands a good deal above high-water mark. I of course have planted it with osiers. I do not suppose that I have done anybody any harm, but if it was a navigable part of the river I could not have done so.

27. (*Professor Way.*) You mean to say that you could not have done it without injury, but you could have done it?—I could have done it if it was not the tow-path side. In that portion of the river which is under the Thames Conservancy the banks are very much cared for, and stand in their own places. If you could compel something of the same sort in this part of the world, you might no doubt prevent a great deal of mischief, and keep the river open much better than it is, both for floods and for navigation. But such preservation of the banks would, I think, be rather a more difficult question to deal with up here than it is down below, from the nature of the soil and from the character of the banks. There is a very peculiar character of bank which is like a house built on a foundation of sand.

28. It gets undermined?—Yes.

29. (*Mr. Harrison.*) I quite understand that; but still if the bed of the river was kept to a proper depth, there would not be that encroachment upon the banks which there now is?—No.

30. Does not that impinging, first upon one bank and then upon the other, result from a bad condition of the bed of the river?—It is so, but I do not exactly see my way to any restraining of people.

31. (*Chairman.*) That I suppose would somewhat represent the bed of the river where you have a steep bank on the one side and a shallow bank on the other (*handing a diagram to the witness*)?—That is exactly it.

32. That face being vertical, and this more than vertical, you have a deep current on that side, and the volume of water is running down there, doing excavator's work, and dropping in the land?—Yes.

33. Supposing that this river was in the hands of conservators, whose duty it was to prevent this kind of thing, the simple method of protecting this subsoil would be to put at this point (*pointing out the same*) a large mass of rubble which would stand, say at a slope of one to one tipped in against that bank, a sort of breakwater to keep the river from washing that bank?—There is a very nice arrangement made at Windsor in the Home Park under the direction, I think, of Mr. Ingram, of Windsor. The bank is sloped down in a regular slope without any rubble or anything of that sort and turfed over.

34. It appears that there is a nuisance of water by fishing?—There is no doubt that there is so by fishing, by things in which they catch eels and other fish. Speaking of the river above Oxford, the navigation is so utterly at an end up there, that it is hardly worth while to talk about any injury to it; but below Oxford I have reason to believe that very often the water is wasted for fishing purposes which might be better used both by mills and by the navigation. I know this abuse to be a fact, it is decidedly one of those things which ought to be looked into.

35. How do the persons owning the fisheries waste the water?—They get a head of water up, and then get in the weir tackle and place their bucks, which are all prepared. The eels run at certain times known to fishermen, and are caught in a very considerable quantity.

36. (*Mr. Harrison.*) Have you any notion of the value of the fisheries?—I should think they are worth very little indeed. There are places, no doubt, where a fishery is a valuable property, but I think that that is as nothing when compared to the injury which is done and the waste of water which takes place. There are times, of course, when letting the water down for fishing purposes will do no harm; there are also times when the water ought to be husbanded in every way for the navigation. With regard to the water above Oxford, there is another cause of waste, I mean the system of flashes. I understand that when the water is low the bargemen go up to the weirs above Oxford and pay so much money, a certain sort of tariff, and the parties draw the water for them and let it down and it

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comes down to King's Weir, and then they draw for their passage down below Oxford; a sort of bargain for the water goes on in which the Commissioners, I conceive, have no voice at all. In fact persons seem to me to deal with the water just as they like.

37. If the navigation were in a proper condition the bargemen would not require these flashes?—Certainly not.

38. It is not, then, a fault on the part of the riparian owners as much as a fault in the system of navigation?—I think you are quite right. I believe that if the river Thames was put into a proper condition you might navigate the river almost at any time; perhaps a little assistance might be needed occasionally, but I think that system of flashing ought to be done away with.

39. Are the fishing rights held principally by the mill owners?—The fishing rights, I think, are a little in dispute upon the Thames. They are generally held either by the mill owners or by the owners of the weirs.

40. In order to have fishing rights you require also a means of control over the water?—Yes.

41. (*Chairman.*) Do you know what is the difference in head between a dry summer level, such as we have had this year, and an extreme flood level, vertically, at any particular point of the river?—The difference of head is a difficult thing to establish, it varies in different places. I have known a flood with us eight feet above high water or flash mark, that high-water mark being at least four feet above the bed of the river.

42. (*Mr. Harrison.*) There will be a great difference of head, will there not, according as the measurement is taken at the weirs, above them or below them?—Yes, the height of the water depends upon the way in which the water is shut in. If the water at Day's Lock, for instance, was allowed to go to waste it would be a mere thread, and the level would consequently be very low; as it is the water being shut in stands at a considerable height.

43. (*Chairman.*) The Thames is peculiar, is it not, in this respect, it is much less subject to floods than some of the other great rivers of England?—I believe it is, because it requires a very much larger body of rain to bring a flood in the Thames than in other rivers.

44. You have the absorbent oolites and chalk and other absorbent stratifications acting as an equalizer. Take the Ouse as it goes down through York, and the Eden as it goes to Carlisle, and you have a rise in flood time up to 23 feet, and in some of the Scotch rivers up to 25 feet?—You have nothing of that sort here. You will not get eight feet in Oxford, or anything like it, excepting here and there and in particular conditions.

45. I suppose that we may take it for granted that the printed evidence which was given by you before the Select Committee expresses your opinion now. You corrected the evidence at the time?—Yes; and I have no reason to believe that there is anything in the evidence which I should wish to retract or modify.

46. (*Mr. Harrison.*) You state in your evidence that if the water were lowered in the Thames at Pangbourne and at Streatley, the water would also sink in the adjoining wells for a mile on each side?—Yes.

47. And that the effect of lowering the level of the river permanently would be to lessen the quantity of water coming from the chalk?—Yes; it would give a lower outfall, accelerate the natural drainage of the adjoining land, and tend to the premature exhaustion of the reservoir of water in the chalk. I cannot positively say this—I only give it as an opinion.

48. Would it not have the effect of lowering the water line in the chalk, which you mention in your evidence as rising 14 feet in a mile?—It might have that effect, but that is a very difficult question.

49. You are aware that it is part of our investigation to inquire into the water supply?—Yes.

50. You are, I believe, better acquainted than any person with the wells in the chalk formation?—I believe that I have made it my study more than any man in England.

51. As to some of the wells in the neighbourhood of Nettlebed, we are given to understand that when they were sunk the chalk was found perfectly dry till a very hard bed of chert was reached, and below that bed the water was found. Is that a general feature of those wells?—I believe so; you get down to the chert when you get to the lower chalk. The condition of the stratum has an influence upon the rapidity of the supply to the well. The chert is not so porous as the chalk. A well in the chalk would fill more rapidly, and more gallons would have to be pumped in order to draw it dry.

52. The chert appears to be a hard bed between the upper and the lower chalk, acting in the same way as a bed of clay would do?—To a certain extent, but not quite, because it is more or less fissured.

53. Is not the effect of that bed to prevent the water from passing freely, at any rate, out of the lower into the upper chalk; consequently, is not the exit for the water out of the lower chalk into the Thames confined to the short length of the river in the neighbourhood of Streatley?—No, I do not think that. I think that wherever you touch the chalk you have water more or less issuing. I am not aware of any place where there is a bed of chert, or anything of that sort, which would act as a bed of clay.

54. Above Streatley apparently there is to some extent?—Yes.

55. In going from Nettlebed towards Oxford I understand that after you pass over the escarpment you get on to the lower chalk and the greensand, and that a great part of the surface is subject to land springs. Is that the case?—Yes.

56. That corresponds with observations made by the geological surveyors in the neighbourhood of Swindon?—Yes.

57. Do you think that drainage of the land, where the water is oozing out, weeping, as it were, on to the surface, has any effect upon the supply of water to the Thames?—I think that anything in the way of land drainage at places where the water issues from the chalk would perhaps have a tendency to affect the perennial supply. But, as a general rule, those places where the springs come out under the chalk do not want much drainage.

58. I refer to those places where the water oozes out?—There is what I have called the back drainage of the chalk, which is rather peculiar in reference to the greensand. You know that the upper greensand is not developed throughout England. About Baldock, for instance, there is a mere thread of upper greensand, and there consequently the gault immediately underlies the chalk, but here that is not the case; the chalk rests upon the upper greensand, and there is a double set of springs—one out of the chalk, and the other out of the greensand. Where there is an excavation down the escarpment of the chalk you will find a spring coming out of the chalk, because the upper greensand underlying it is a porous stratum, perfectly waterlogged.

59. In the case of water weeping out of waterlogged chalk and greensand, would not the greater part evaporate and be very injurious to agriculture? and would not an artificial drain made in such land have the same effect as a natural spring and no more?—You could not drain the water away entirely; you could only lower the water line, or water level. How far the perennial flow of the river Thames would thus be affected is a very difficult question to answer; but I think that the drainage of the greensand under the chalk probably would have a tendency to affect the river Thames, and that the body of water in the river being thus reduced would be more subject to evaporation. I think that from land drainage in those districts there might be a great deal of danger of lowering the supply of water.

60–1. It could not lower the water more than a few feet if pipes were put into the ground?—No. There are so many different conditions of springs. In some cases a large body of water issues in a spring at the bottom of an escarpment like the chalk; anything

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which you might do with that would make very little difference; but when, as in the valley of the river Thames, there are alternating beds of clay and the oolitic rock, and water running out at all sorts of levels, there it appears to me land drainage can very much affect the perennial supply, and in the Thames valley I think it has actually done so.

62. You state in the evidence which has been alluded to your belief that land drainage in the upper parts of the Thames may endanger the supply of water to London?—I have every reason to believe it.

63. There are large portions, both of chalk and of oolite, where the water flows deep and comes out in springs?—Yes.

64. Would those extensive surfaces of chalk and oolite not waterlogged be affected by drainage?—Not at all.

65. Therefore it is only when the chalk or the oolite is waterlogged that the drainage could affect the question?—Yes. I am now speaking, of course, of perennial supply.

66. Does the water which so weeps out of the surface find its way into the Thames?—Sometimes it would, sometimes it would not; there might be all sorts of conditions. A large and a very strong spring of course would force its way down.

67. That is a spring?—The weepings are springs of an inferior character; they would probably be called little springs by the people, it is only a difference of size.

68. Would not the effect of land drainage where the water is only weeping out of the surface be merely to form by artificial means a larger spring?—No; you might tap that which comes out weeping so as to bring it into a thread of water. People puzzle themselves with what they call a spring. I never talk of springs more than I can help, because I look upon them merely as issues of water from a waterlogged stratum the surface of which would be generally represented by a line. The geological stratification always accounts for the weeping out of water. Near Cirencester a thin bed of oolite three, four, five, or six feet deep overlies the upper lias clay. During the whole of the summer, in the natural condition of the soil, there would be little springs finding their way down to the river; but a man wanting to occupy that land for agricultural purposes would cut his drains down to the clay, and the water would flow off at once; there would then be no water in the summer at all.

69. If you could look underground, you in all probability would find a water line similar to what you have described in the chalk leading from the place where the water weeps out, for some distance?—Yes, but still the porous stratum might be so circumscribed that it would be quite possible that certain drains cut into it for agricultural purposes should entirely deprive it of its water. If you go to the gravel, there is hardly a gravel which you could not drain through.

70. Where the water only weeps out as you mention, does it ever reach the river? Does it not evaporate?—If it evaporates, the drain of course will produce no bad effect upon the perennial supply, but the contrary; for instance, if the quantity of water is so small that in the weeping out it makes a peat bed. There is a case in point at Mechi's Farm; there there is a great bed of gravel, and there is a sort of escarpment of this gravel, and at the foot of this was a low place, a peat bog made by the weepings. Alderman Mechi cut some deep drains into this bog and gathered the moisture into one head, and so procured a water supply for his entire establishment.

71. Will you be kind enough to reconsider the question whether land drainage affects the perennial supply of the river?—I will. I think that the qualification with which I armed my statement will bear me out; but I will look particularly over anything I have ever written on the subject. I know that the question is a very important one.

72. And such a statement as that the Thames water is likely to be seriously diminished by land drainage, coming from an authority like you, of course acquires great weight?—I felt at the time that the statement was very likely to be called in question, but I made it with very great confidence.

73. (*Professor Way.*) You believe that land drainage will reduce the average supply of the Thames, both in flood and in drought.—Yes, there is an immense deal of land drained in the valley of the Upper Thames. Mr. Bailey Denton has drained a good deal, and other people have drained a good deal, everybody drains; the consequence is, that you make the whole surface like a clay bed; you take every drop of water.

74. And you also drain adjoining land?—Yes, but I would not go into that question. What Mr. Harrison has said would be exactly the difficulty. I know that I should be wrong if I made the statement too broad, I must confine it to those portions which are almost isolated by the geological condition of the soil.

75. (*Mr. Harrison.*) But still I suppose there is a head somewhere?—I think Mr. Bailey Denton is wrong when he speaks of the question of the water of pressure—it is a very dangerous term.

76. A great part of the water of the Thames springs from the sands of the upper lias?—Yes, I suppose that a good deal of it does.

77. (*Chairman.*) Are there any considerable areas above Oxford, within your knowledge, so absorbent as to take any water which rises in the stratification above?—Yes, there is no doubt of it. In the river Churn there is a place where the water will disappear. If you called Mr. James Simpson, the engineer, before you, he would tell you that he was employed by the owners of mills on the river Churn to investigate that subject, and it cost a great deal of money. I had in my house for many months all the sections and all the details of it, and it was a most extraordinary and curious investigation; but he came to this conclusion, that anybody who dared to tamper with the Upper Thames would only dry it, and there would be an end of the water.

78. Taking the oolites and the chalks and the greensands as water-bearing stratifications, shall I be right in comparing them to a sponge?—I should like to keep every stratum to itself. I think that each stratification has its own characteristics, and that if you generalise you will be wrong. To a certain extent chalk is like a sponge, but a sponge generally holds the water all over it, whereas the chalk only has it up to a certain level, the water in chalk is always inclined. Ten feet in a mile is the least that I have ever levelled it to.

79. That is the capillary attraction of the sponge?—It is the friction.

80. (*Professor Way.*) Of the insterstices?—Yes, and it has nothing to do with capillary attraction. Take a lump of chalk as big as this inkstand, and weigh it carefully and put it into the fire and evaporate almost every portion of water from it, if you were to surcharge it with salt and water you would have an efflorescence of salt over the chalk.

81. (*Mr. Harrison.*) If you took a piece of chalk, dried as you suppose, of a foot cube, and put it into a large dish, with an inch of water in that dish, would not that chalk draw the water up into it?—Yes.

82. Is not that by capillary attraction?—Yes; the chalk would get the water into it by capillary attraction, and then it would hold it, until it was evaporated from it.

83. (*Chairman.*) But if, instead of evaporating the water, you let it run out of the chalk, you would diminish the body of the chalk?—I suppose that the chalk would contract in some way; but if you take a piece of chalk out of a chalk pit and then evaporate it, you will find that the quantity of water which you can make it take up again will be as nearly as possible the quantity of water which you first found in it. Practically, the amount of water in a chalk stratum is merely that which is in the cracks and crannies; you might just as well say that you would take so many cannon balls and put water into them, only that there the interstices would be so large that the water would run between them.

84. There are interstices between the grains of

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chalk, without absolute fissures ?—You never can get chalk to drip.

85. Is not chalk a great reservoir of water, which is contained as in a sponge ?—I will not allow it to be a sponge. There is no capillary attraction in a sponge. If you take a dry sponge and put it on a surface of water the sponge will not take up the water, but chalk will.

86. (*Mr. Harrison.*) I see that in one of the answers which you gave before the Select Committee you stated that there is always an antagonism between the mills and the navigation, and that there always will be ?—I think that under present circumstances there must be, for this reason, that the object of the mill owners is to make the most of the water for their purposes, and therefore they keep up the head of water. I believe that if there were restraining powers, with reference both to the navigation and to the mills, the interests of the two might be identical. If by husbanding the water on the part of the mills, and by a proper regulation of the water on the part of the navigation, you always kept such a head of water as to preserve the body which naturally flows down the river, I do not see why there should be an antagonism ; each party would use the water coming to him in a fair and legitimate manner.

87. (*Chairman.*) Do you think that the present weirs and mills on the Thames can be retained and worked without injury to the navigation or to the lands ?—Yes ; if you do what you ought to do, in order to relieve the lands from the surface water, I cannot understand why you should not retain both the mills and the navigation. I do not mean to say that in some cases the removal of a weir, or of a lock, might not facilitate your operations in getting rid of the water upon the land, but I do not see why the two things are not compatible—I mean as a great principle, not saying anything about particulars. I will not, for instance, say anything about such a thing as the arrangement of water at Sandford. I think that arrangement ought to be altered.

88. (*Mr. Towle, through the Chairman.*) Are you aware that at Sandford Lock, which seems to be treated very tenderly indeed whenever it is alluded to, all the waters of the rivers and railway cuttings, and the brooks, private and public, meet ; the water is brought down to this very Sandford Lock, which is just about in the form of the letter V, and there it stops and passes no further ?—Yes, I am fully aware of it.

89. What is your opinion with regard to the excavations of our beds of gravel all round Oxford. You are aware that we are now excavating the gravel out of the rivers, and have been for several years past, that some of our excavators have nets at the end of their poles 18 feet long, and that every bit of gravel which is now being used in our large buildings is all to be river gravel, and has been contracted for as such, and so is the gravel used for the streets and roads. I would simply ask you whether you do not believe that making these excavations almost as big as some of the churches does not take an immense quantity of water out of the rivers ?—I do not see how it can take the water out of the rivers ; there is no hole at the bottom of the river, there are 500 feet of clay below you, and any hole you make in the gravel rather forms a reservoir than otherwise.

90. Did you ever see a dredging machine upon the river Thames in all your life ?—I have seen a good many down below, but I do not think that I ever saw one up here, they work the dredging here by a scoop.

91. By digging holes ?—Yes.

92. (*Chairman.*) You never saw a proper steam-engine dredging machine here, such as they employ on the lower reaches ?—No.

93. (*Mr. Towle, through the Chairman.*) Do you think or not that the Thames is the most ill-managed river in the kingdom ?—I do not know much about other rivers, but I think that the other rivers are very badly managed if they are not managed better than the Thames is.

94. (*Mr. Harrison.*) Knowing the river thoroughly well, you are aware that whilst the upper part of the river above Oxford is remarkable for the shallowness of its reaches, the part below, where the river goes through the chalk formation, is very remarkable for many very deep reaches. Can you give us any idea of the cause of those deep reaches ?—It is a little difficult to answer that question off hand. In the first place, there are some very deep reaches up above.

95. I mean continuous deep reaches ?—I do not know the lower part of the river so well, but I think that one of the reasons of the difference probably would be the character of the gravel in the two places. There is not exactly the same gravel after you get below Pangbourne as in the upper reaches. In the valley of the Upper Thames the gravel is more of a shifting nature, and is more easily acted upon ; the banks are more subject to disintegration. This would account in a great measure for that silting up and blocking up of the river.

96. I did not ask as to the silting up of the upper part, but as to the cause of the deep reaches which continue for miles and miles in the lower part ?—We do not know exactly how those beds have been made, but the floods have deposited all their débris before they come down there. I rather think that if you examined the matter closely it would be found that those deep reaches result more from the character of the stratification.

97. (*Chairman.*) You have paid quite sufficient attention to geology to know that each distinct stratification has, if one may use the term, its own contourng. If you could lift the alluvial gravel from the chalk you would find a different set of contours on the surface of the chalk ?—Yes.

98. In fact a set of contours belonging to what might be assumed to have been the surface ?—Yes.

99. Then the alluvium fills them all in ; may not some of the deeps and hollows which Mr. Harrison has alluded to be these pot holes or natural valleys in the chalk, and the shallows the ridges, the elevated parts ?—Yes ; it is a difficult thing to say how it happened, but what we see now may throw light upon the subject. In some cases here and there we see the gault clay rising above the high-water mark. The current impinges upon that gault, or frost will bring it down, and the gravel above it will come tumbling down, and then there will be a great hole. In such a case you have something like what you have at a mill tail, namely, a great shelf of gravel, and a little further on a great hole. Now in the upper part the river runs over the Oxford clay. I remember that Mr. Saunders made a survey of the river, he gave us some sections of the upper part of the river, and it was all ups and downs, one could hardly believe it. I think that this irregularity may be traced first of all to the character of the bed, whether clay or stone or chalk, and then again to the débris which is brought down and is always shifting in the river.

100. (*Mr. Harrison.*) What I wished to ask you was as to the deepening through the chalk formation ?—The water would act upon the chalk bottom to a certain extent, but could never be able to make such continuous excavations. It might excavate the soft parts here and there, but after each excavation would be found a shelf formed.

101. Have you ever calculated the quantity of carbonate of lime, namely chalk, which is carried daily by the river over Teddington Lock ?—No, but I have made calculations that in a century a cubic foot of the surface has been parted with.

102. (*Chairman.*) You may take it for granted that the Thames water has about a ton of carbonate of lime for each million gallons of water ?—That is from the gradual disintegration of the chalk stratum.

103. (*Professor Way.*) The question which Mr. Harrison has asked you is whether any large amount of that carbonate of lime comes from the bed of the stream ?—I think that there is a deposit of carbonate of lime going on.

104. The water deposits instead of taking up any more ?—Yes ; in an excavation in the old bed of the river

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we found pieces of stone, and so on, with a very large accumulation of carbonate of lime upon them; they had been there in the old bed of the river undisturbed for generations.

105. (*Mr. Neate, through the Chairman.*) Where does Oxford get the carbonate of lime which is in its water?—I should think from the chalk and also from the oolitic strata.

106. But there is very little chalk above. — All the water coming from the chalk would be charged with carbonate of lime, and also all coming from the oolite.

107. (*Mr. Harrison.*) No chalk water comes to Oxford, does it?—There is a little above Oxford, but not much; as little comes down the Swill brook, the Ray, and the Cole.

108. The Swill brook is mostly upon the Oxford clay?—Yes.

109. (*Chairman.*) Is there anything which you wish to add?—An explanation is suggested to me. When I talked of the rain producing floods, of course I referred to the western rain falling in the upper part of the Cotswolds. I venture to suggest one other thing which I think of importance, namely, that the question should be considered how far the sewerage operations carried on in Oxford might not also be used to assist in the drainage of the land where the pipes pass under the river.

The witness withdrew.

Edward Harcourt, Esq., of Nuneham Park, Oxfordshire, examined.

E. Harcourt, Esq.

110. (*Chairman.*) I think that you have had some experience of the injurious effects of flooding and also of embanking, and the benefits derived from it?—Some years ago a bank was made on a part of our property. Those who know West End and Shifford will perhaps know the place. The length of the embankment I think is somewhere about two miles, and the height quite insignificant. You would hardly believe till you saw it that so very small a matter could produce so much good. One tenant told me that he calculated on his farm alone the area of land benefited to be 100 acres; from so much did the embankment keep off the soakage water during the time when it is most injurious, namely, the summer time. Then, again, although my private opinion is that no great things can be done unless there is a general scheme, yet I think that if you begin to generalize too much it will be a mistake, because there are different local circumstances which must guide you in your proceedings. Just below Pinkhill there is at the present moment a design to make a bank of something like six miles long from Newbridge very nearly to Ensham. This comes from seeing how much the land at Shifford was benefited by the other small bank I have described.

111. (*Mr. Harrison.*) What area will that six mile bank benefit?—The plan, I believe, is now before the Inclosure Commissioners, and until it is definitely marked out I cannot answer that question. There are some portions of land which would not be benefited by such a scheme, and those of course have to be considered. For instance, in one field, the tenant who occupies it considered that flooding to a limited extent benefits his land, because the flood only comes at such times when irrigation is of use, and never lies on the land long enough to sodden it and be deleterious. He wished therefore that the bank should be diverted there so as to allow the water to flood his land.

112. (*Chairman.*) What is to prevent that particular farmer having a sluice or sluices in the artificial embankment under his own control, so that he might let the water on to his own special land?—The special area is so small that the plan adopted is this: where a farmer imagines his land will be benefited by having the river occasionally on it, the bank is carried further inland.

113. The bank is taken round the farmer's land so as to shut it into the river?—Yes.

114. (*Mr. Neate, through the Chairman.*) Is there not a good deal of land which is benefited by the floods?—Within that area of six miles there is only one field of something like 30 acres which is so benefited.

115. Within what distance of the river?—Close adjoining the river.

116. When you get a little further from the river is there not a good deal of land benefited by the floods?—I imagine not. Anybody who knows that country well knows that during the greater part of the winter it is under water, and very often in the summer. Again, if you go higher up the river to Shifford the water is thrown back by the shallowness and the accumulation of gravel and stuff at the bottom of the river. At Newbridge it has accumulated to such an extent that the farmers above at Shifford imagine that it is in a great measure the cause of the accumulation of water which covers their land in winter time.

117. (*Chairman.*) Have you formed any idea of what sort of jurisdiction might be framed for the management of the river generally for its navigation, its fisheries, its mills, and its embanking for agricultural purposes?—No, I cannot say that I am prepared to answer that question.

118. I suppose that the present system of management by the Commissioners is, so far as it exists, now a failure?—I do not see much advantage in it.

119. The Commissioners were appointed principally to look after the navigation?—I suppose so.

120. (*Mr. Harrison.*) Where the river has been embanked is there no connexion between the river and the ground within the embankment?—None whatever.

121. (*Chairman.*) Is there no injurious effect to the land?—No injurious effect; on the contrary, any occupier of land will tell you that it is very much improved.

122. What length of time do your floods continue? —Very often for the greater part of the winter.

123. What part of the river are you speaking of?—Between Newbridge and Ensham—just above Newbridge.

124. The land must be flooded in the summer also? —The summer floods are most injurious.

125. You have more water falling in the summer than in the winter?—Yes.

126. (*Mr. Harrison.*) The summer floods are more injurious because they come upon the crops?—Yes.

127. You are a proprietor of land adjoining the river for some distance along the river?—My father is.

128. What are the rights which you have and exercise with respect to the river?—At Nuneham, from the loch to Sandford we have the right of fishery on both sides of the river though the land on the one side does not belong to us. We mow the grass and cut the willows and rushes, and that sort of thing, up to the towing-path (this is called the swath), and we have also rights of fishery up to Sandford.

129. What rights have you above at Newbridge, where you have only one side?—There we have half the river.

130. What power have you dredge the river opposite your property for the purpose of deepening the channel and carrying the water off?—That I do not know.

131. I see that the committee which was appointed in 1853 to examine the upper reaches of the river complained, not that the Commissioners did not dredge the river, but that the proprietors did not do it. Who do you think ought to do it?—I should say the Commissioners. I do not see how the proprietors of the land can be called upon to go to that expense; it is a very expensive affair, and we have nothing to do with it.

132. (*Chairman.*) Are there any conditions imposed upon you by the Commissioners, or others, as to maintaining the banks through your own property?—Not that I am aware of.

133. If the land wastes it is your loss?—Yes.

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134. And no person has power to come upon your and, or to call upon you to prevent that waste ?—None. I believe that it is a case of give and take—you lose in one place and gain in another.

135. If you saw your land going away at one part of the river at the rate of two or three yards in a year, you could call upon no person to obviate it ?—No, it is give and take.

136. (*Mr. Harrison.*) The Committee of 1853, to which I have alluded, say that "they find all the evils "of high floods much increased by the negligence and "inattention of the landowners and occupiers them-"selves, who have in no observable instance done any-"thing towards keeping the natural channels for the "water open, but have on the contrary encouraged "their contraction by the growing of willow boughs "and planting every sandbank and deposit in the river "for growing rods and for the purposes of fishing." Can the ordinary occupiers of land be called upon in any way to clear out the bed of the river ?—I think not. We think that it ought to be done. I have no doubt that owners of land would be better pleased than anybody to see such things properly regulated, as it would evidently be to their advantage.

137. It would be evidently to their advantage if the river were put under some control, and kept to a regular depth and with a regular channel ?—Yes ; but as to the complaint of land being gained improperly, I cannot see that there is any force in that, because the few inches of land gained are comparatively very small.

138. Do you think the landowners would agree to have their land subjected to a rate to meet the expense of embankment ?—Any landowner who looks properly to his own interest would take means, by embanking and otherwise, to secure his land from floods. The work is now necessarily done by individuals, simply because there is no general plan and system in force.

139. What is done in that way by an individual is done for the benefit of the individual, to the disadvantage of his neighbour above and below ?—No ; the area benefited by such a bank is very extensive, goes many miles inland, and many farms and many landowners are benefited by such an embankment who pay nothing whatever for it.

140. Would not the effect of the embankment be to raise the water during a flood ?—I think not ; that is not the effect of the small embankment of two miles which has been made at present.

141. The present embankment, though on one side of the stream only, narrows the channel already ; if another is carried out on the other side, its effect will be considerably to narrow the channel ?—You must not consider it as a narrow channel which is left, because the bank is put a good way back. There is a very wide margin between the bank and the river, and where this bank is made it is necessary to cut down all the obstacles of high hedges and trees between it and the river ; thus a clear passage is made for the river clearer than before it was blocked up.

142. There is now no authority to which you riparian proprietors could appeal and ask to undertake this work of embankment, even if you were yourselves willing to pay the cost of it, and to submit to a general measure ?—No.

143. (*Professor Way.*) It might be possible for the landowners to secure themselves from flood otherwise than by embanking, namely, by improving the river itself ?—By way of deepening the channel.

144. And by a better adjustment of the locks and weirs ?—Yes.

145. (*Mr. Harrison.*) At present the streams bring down a large quantity of mud which is carried over the banks and deposited, and tends gradually to silt the channel up. What will become of that mud after these embankments are made ?—I cannot see that there would be any difference in that respect.

146. It will come down the river, where will it go to ?—I suppose that it will go where it does now. At the present moment what becomes of the mud at Newbridge is that it collects in the centre of the river ; it will very soon form an island there.

147. After you had made your embankments so as to enclose this land from the river, would it still not be necessarily to the advantage of the landed proprietors on the banks to see that the river was kept in proper order ?—I cannot deny that it might be beneficial in the way of barges coming and carrying manure, and all that sort of thing ; but whether the landowners would be willing to be taxed for keeping the river in order is quite a different thing. One way of surmounting these difficulties might be by a voluntary measure for rivers corresponding to the new Highway Act for roads ; the residents in any district to adopt the Act or not as they like ; if they do adopt it the district to be put under a sort of local government.

148. (*Chairman.*) After you have once elected to put your district under the machinery then the permissiveness ceases ; then any outstanding person in the district cannot resist the rate levied by the Board which is established ?—No.

149. (*Mr. Harrison.*) Would it do to place one part of the Thames here, and another part there, under such permissive authority, and to leave out the parts between them ?—No ; I think if the majority of owners in one locality agree to be subjected to such authority, the minority should be compelled to submit.

150. The work must be done as a whole ?—Yes.

151. Is your remedy for the evils of the Thames below Oxford, as well as above, to embank it ?—No ; I do not think that there are at all the same conditions. Standlake, for instance, and all that country lies very low and flat, whereas below Oxford the land is very much more undulating ; it is a different nature of country altogether.

152. And the floods do not so injuriously affect the land ?—No.

153. (*Chairman.*) Is there anything which you wish to add ?—I wish to mention one point, namely, the injurious nature of the ingredients which at Sandford mill are now turned twice a week into the water. We live several miles below it ; the water comes down even as far as us, which is perhaps four miles, in a regular state of froth ; the whole river is covered with froth, and the fish are killed.

154. Is that a paper mill ?—Yes ; our keeper finds fish, pike of one or two pounds weight, lying turned over dead.

155. (*Professor Way.*) To whom does Sandford mill belong ?—Mr. Norris.

156. (*Chairman.*) Could not you enter an action against him at common law ?—Yes, undoubtedly, but that is a disagreeable thing to do.

157. (*Professor Way.*) Is there any smell ?—No.

158. (*Chairman.*) Does any sewage from Oxford at present affect you ?—I believe not.

159. Do you think that in the event of the entire city and its suburbs being sewered, and the sewage being turned into the river at the proposed outlet at Sandford, your property would be affected ?—Decidedly ; we should endeavour to resist that as much as possible.

160. (*Professor Way.*) How far are you below Oxford ?—Six miles.

161. (*Chairman.*) Have you anything further to add ?—No.

The witness withdrew.

Adjourned to to-morrow at 10 o'clock.

Oxford, Wednesday, 1st November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

Dr. ARTHUR ROBARTS ADAMS examined.

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162. (*Chairman.*) What connexion have you with the river Thames?—I am a fellow of St. John's College, which has a large quantity of land bordering upon the upper part of the Thames. I speak particularly of that commencing just above Skinner's weir, and continuing from there on with intermissions up to Limber's weir and above.

163. Are you personally acquainted with the Thames where it flows through the property with which you are concerned?—I am very well acquainted with it. I am very constantly on the banks of the Thames, and have of late years taken considerable interest in all the drainage operations which we have had to carry on.

164. There are fishing rights on the Thames?—Yes. We are owners of a weir at which there is said to be a fishing right; it is called Cock's weir; it lies between our property in the parish of Fyfield and the parish of Northmoor.

165. Do you make anything of this fishing right?—It is in this position; it has been connected with an old manor lease for many years, probably ever since the College was created. That lease has now expired, and on the 10th of October the fishing rights with the lease came into the College hands. We, knowing that this inquiry was going on, thought it right to exempt the fishing rights from the new lease in order that we should keep them in our own hands; we felt quite satisfied that the fishing rights were not of any value commensurate with the injury which might be done by persons using the water for the purpose of catching fish; we are the owners of land on both sides.

166. Have you earned any rental from that fishing right of recent years?—Not a large one; about 25*l.* a year for a public-house, seven or eight acres of land, the weir, and the fishery—all together. The fact is that the value of the fishery is a bagatelle to all intents and purposes.

167. If you tried to eliminate the absolute value of the fishing it would be a very small sum?—I could not tell you what it would be. We have also a right, or presumed right, of fishing below that spot; we have both sides of the river, and of course where that is the case we claim the right of fishing over the whole stream from either bank; where we have half the river we claim the right to use the half, and as long as our people do not draw out the fish on the other side we say that we are in the proper exercise of our own peculiar rights. But there are rights of fishing, like what Colonel Harcourt mentioned yesterday, where persons have what is called a staff, that is to say a right of fishing on the side where they have no land; they have a small passage, or right of way, which they exercise by drawing their nets out, and I believe by cutting the grass at times.

168. (*Mr. Harrison.*) Just to establish the right?—Just to keep up the right. Those rights are of course more valuable than the half rights usually possessed by those who have property only on one side of the river, as we have in most places; but I confess my inappreciation of the value of the fishing right as regards my own College.

169. (*Chairman.*) Have you had any experience of the uses of the river for navigable purposes through your property?—I have taken the trouble to inquire what quantity of traffic passes over the district which I am now mentioning. It has become very small. Above Ensham Bridge the traffic only goes as far as Newbridge. Above Newbridge there is no traffic at all, and (I say so in the presence of Mr. Graham, in order that he may correct me if I am wrong) there has not been a single boat in the last 10 years which has passed above Newbridge. Between Ensham Bridge and Newbridge the boats are frequently stopped, owing to the very low state of water and the numerous banks which have grown up in the channel. The channel is very crooked in parts. There was an old weir at the Ark which has blown up altogether. Nobody will renew it, and the consequence is that there is a considerable scour, so that a very difficult passage is formed. The bargemen have to pass the horses round a stream which adjoins; it is a very awkward place. By reason of these difficulties boats have become very few indeed. In summer they cannot take up more than half loads, seven to eight tons or ten tons, and sometimes they cannot go at all. Each year the traffic seems to fall off. The Witney railway affects it to a considerable extent, and as that railroad is extended it seems to me that the river traffic will be annihilated. Below Ensham Bridge there is a traffic going across to the canal. It is worth the while of traders to come out of the Oxford canal and go up to Ensham, for the purpose of taking coals there and bringing back corn into the midland districts, but such traffic passes over a very small portion of the river. There is no traffic direct between Oxford and Ensham by the river. If any traffic ever goes from Oxford to Ensham it goes along the Oxford canal to the lock, and then by King's weir, and so to Ensham. It never goes now up by Medley lock. I do not believe that there has been a boat through Medley lock for the last three or four years—I mean a boat of trade.

170. (*Chairman.*) I suppose it is a notorious fact that the navigation works upon the Thames, such as the weirs and locks, are in a very dilapidated state?—Yes; Pinkhill lock, for instance, which is one of the Commissioners' locks, is in a very dilapidated condition; in fact it is hardly safe for a boat to go through.

171. And I think that it is equally notorious that the Commissioners, or the persons having charge of the navigation, are not in a position to repair or maintain it?—They never have done so for years. We ourselves repaired the weir which we have at a considerable expense some years ago. We cut down a large quantity of timber belonging to the College, and expended a large sum of money in repairing it. We believed that we were in duty bound to do so.

172. (*Mr. Harrison.*) As the weir owners?—Yes.

173. (*Chairman.*) Was that for purposes of navigation, or merely to maintain your fishing rights?—Wholly for navigation.

174. (*Mr. Harrison.*) You being the lock owners?—The weir owners.

175. A weir owner is in the same position as an old lock owner?—Yes.

176. (*Chairman.*) Have you formed any opinion as to the advisability or otherwise of attempting to restore the river to its navigable uses?—Above Ensham Bridge I do not think that there is any reasonable hope of anything like a traffic coming upon the river.

177. Not even if the navigation works were put into an efficient state?—Not even if a canal was made parallel to the river.

178. (*Mr. Harrison.*) Is it possible to judge of what the traffic upon the river would be when we hear the description which you give of the impossibility of any traffic going upon it?—Yes, I think so, in this way: at the time when the railroads were first established the state of the navigation was very much better than

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it is now. The moment that the competition of the railroads commenced traffic upon the river began to fall off in the upper part. There is no great reason why any traffic should come down the river. The river does not run from the coalfields. The greatest part of the coal coming into Oxford comes from the midland counties by the line of the Oxford canal. There is no coal to come down the river. The country where the river rises is the Cotswold Hills, and there is nothing to create a sufficient traffic to keep up the navigation.

179. There is some traffic from Lechlade to Newbridge, is there not?—I never heard of it. I asked particularly at Newbridge when I was there a little time ago when they had had a boat down last, and I was told that they had not had a boat down for years.

180. (*Chairman.*) Do you think that that was in consequence of the defective state of the navigation, or simply because they had no boat to send down?—I think that it was simply because they had nothing to send. I know that some gentlemen in Oxford some years ago attempted to carry coal down here from the Forest of Dean, but it would not pay. The expenses were greater by that route than by the competitive route of the Great Western Railway. Railways conveying at a halfpenny a ton, with a certainty at all times, will in my opinion always beat the river navigation, for they have been able successfully to compete with canal navigation, which to my mind is superior to river navigation.

181. I daresay you remember that Mr. Brindley, the celebrated engineer, once, in advocating the formation of canals, was asked his opinion of what rivers were made for, and his reply was, to feed canals?—Yes, I know that perfectly, and I am quite satisfied that the time for river navigation in a competitive sense has passed.

182. Have you had any experience as to the construction and maintenance of the towing-path along the river through your college property, or in any other place?—Nobody takes any notice of it at all.

183. If a towing-path is made parallel with the river through any property, to whom does that towing-path belong?—I believe that that is a disputed point. The land belongs to the landowner, but the right of way belongs to the persons who pay the tolls. I am now speaking of a part of the river where the power of the Commissioners has seemed to have died out. There has never been any interference on the part of the Commissioners upon the upper part of the river within my knowledge.

184. (*Mr. Harrison.*) I suppose that the towing-path, where it has not been actually purchased by the Commissioners, would be pretty nearly in the same position as highways in other parts of the country?—Very much.

185. The land for the highways belongs to the adjoining proprietors, and the right of way to the public?—Yes, I expect that that is so.

186. (*Chairman.*) Do you happen to know whether or not a proprietor could exclude from the towing-path the public generally, confining it to the persons using the navigation—because the word "private" is used in some of the Acts?—That raises a point of law which it would be very difficult to answer.

187. (*Professor Way.*) But are people allowed to walk when they like on the towing-paths without interference?—I should say that they are.

188. Could I take a fishing rod along the bank?—You would then be directly warned off, because you would clearly not be connected with the navigation. But those are very small details, upon which I do not know that I can give you much information.

189. (*Chairman.*) If a towing-path is washed away by a flood and the land is removed, upon whom does the making of a new towing-path rest?—None is made. In the upper part of the river there are many places where there is hardly a trace of a gravel path to be found.

190. The centre of the river is the boundary between the owners of the land on the two sides?—Yes.

191. Supposing that that river can be proved within the memory of man to have materially shifted its line, is there any attempt to renew that boundary?—No, but the old boundary line remains. I know two or three cases where some land which belonged to Oxfordshire now lies over on the Berkshire side of the present river. Only the other day I saw a most extraordinary little bit which had been cut off at a sudden curve of the river, so as to leave a part in Berkshire and a part in Oxfordshire.

192. (*Mr. Harrison*) Was there any immediate cause in the bed of the river for that cutting off of the piece?—In some places the cause is the erection of weirs. In the spot I have referred to there were shoals, and the Commissioners wanted some water to be raised there, and they found that it was not convenient to have these very sharp curves, so they made a short straight cut. In other places the cause of the alteration of the channel has been evidently nothing but the action of a flood.

193. Was the action of the flood consequent upon the previous formation of a shoal below the point where the flood crossed?—I should not say that. I know that in foreign countries floods take very curious courses, very often open a channel through a part which was never a channel before—they begin to abrade the bank, and then the water comes pressing on, and goes on until at last it forces its way through, and takes a different course altogether.

194. (*Chairman.*) It is not uncommon in Spain to find a bridge standing in a dry valley and the river a mile off without a bridge, though the bridge was originally built over the river?—In the case of the Ganges, I have heard from Mr. Simms, the engineer who was sent out by the Government, that the shifting of the banks is not to be calculated by yards but by miles in places. There the river comes down in full flood, and remains in full flood for a considerable time. When the floods subside it is not at all uncommon to find the channel of the river in a totally different place from where it was before. I do not mean to say that anything of that sort occurs in the upper valley of the Thames.

195. (*Mr. Harrison.*) I suppose that when the river was in its original state that would be the character of its action—every now and then it would make breaches across in different directions and would twist backwards and forwards through the valley?—Yes.

196. But that would be consequent in all probability upon the formation of shoals at particular places. If the river was under good direction should those shoals be allowed to be formed?—I think for this purpose that man may exercise his ingenuity as much as he will upon a long river running in an alluvial district through varieties of soil, where there are often shelves of flat rock having gravel over them and sand underneath them, and he will exercise it in vain; shoals must, from a sort of zigzag action, commence in the river, and from the moment the zigzag action commences you never get rid of it again. That is one of the reasons why I think that the river navigation is not a navigation which ought to be created in the present day.

197. (*Chairman*) Is there any recognized authority having power to examine and settle as to the positive boundary of riparian lands?—No.

198. Do you think that it would be advisable that any new commission should have authority to settle, once and for all, where the boundary between properties exists, so that it shall not be contingent upon these shiftings of the river?—If you will refer to the 62nd section of the Land Drainage Act, 24th & 25th of Victoria, chapter 133, I think you will find that Parliament has taken the same view. That section is as follows: "Where in exercise of any powers given by "this Act any watercourse forming a boundary line "between two or more counties, hundreds, parishes, or "other areas defined by law is straightened, widened, "or otherwise altered so as to affect its character as a "boundary line, the commissioners, board, persons, or "person under whose authority such alteration is

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"made shall forthwith report the same to the Inclo- "sure Commissioners, and the Inclosure Commis- "sioners, if satisfied that a new boundary line may "be adopted with convenience, shall by notice to be "published in the London Gazette, and in such other "manner as they may direct, declare that the water- "course, as altered, shall either wholly or partially be "substituted for the former boundary line, and the "limits of the areas of which the watercourse when "unaltered was the boundary shall be deemed to be "varied accordingly."

199. (*Chairman.*) I refer to property in private ownership?—If we are to have a commission of drainage, or a commission for the management of the river with a view to the estates of the riparian owners, then I think it is but reasonable that there should be power to settle boundaries, compensating owners (just as in the case of an inclosure), and making over to them what you call allottable lands. In fact this would only be carrying out for private property the plan already recognized in the Drainage of Land Act for fixing the boundary between hundreds and parishes and counties.

200. (*Mr. Harrison.*) The Conservancy Board in the Lower Thames have power to call upon owners of property to preserve their river frontage. Would it be right that any board for the Upper Thames should have similar power?—I think that riparian owners ought not to be called upon by Parliament to assist in keeping up the navigation of a river, where the navigation tolls and the profits on that navigation go to other parties than themselves. I think that it is subjecting land to a servitude which is not just as between man and man, and I certainly should think it my duty to agitate very strongly if any attempt were made to subject owners of property in the Upper Thames valley to that duty which is said to be thrown upon riparian owners on the Lower Thames by the Act of Parliament to which you allude.

201. If you think it would not be advisable to give any further powers to call upon riparian owners to preserve the banks, would it not be right to give power to prevent their encouraging the growth of land in the way in which it is stated that they do at present by planting willows, and so on?—My own opinion is that that action of the owners has been very much exaggerated. I think that they have merely availed themselves of the shallows which have appeared above water, but I do not believe that any owner, except in very isolated cases (and I know of none), has endeavoured to make land. Owners have availed themselves of the act of God, as it may be termed, but they have never induced that act in any way.

202. (*Chairman.*) To quit that portion of the subject, I wish to ask a few questions as to the reputed dredging, deepening, or removing of material from the bed of the river; has it taken place upon that portion of the river where your college property lies?—Not to any extent that I know of. The bed of the river there is rather different from what it is just about Oxford itself. If you look at this map you will find that the river in the upper district runs on to the very edge of the Oxford clay, and the consequence is that one bank is high and the other bank is low alluvial deposit and silt, very open, and I believe that the bed of the river for a long distance is absolutely in the clay itself; all the gravel has been washed away from that particular part, therefore there is no gravel to extract in that part. About Oxford I know that gravel is extracted to a very large extent.

203. Have the Commissioners the exclusive privilege of dredging for gravel, or have the riparian proprietors, and can these sell it to others, or under whose control is the gravel taken out?—In this part the city of Oxford claim it in the free water.

204. Do they claim it exclusively?—I fancy that they claim it adversely to the Commissioners.

205. Have they absolute power—can they stop any person else?—They claim the right to do so.

206. Have the Commissioners a right or not to dredge?—I am not aware of it.

207. We have been told that steam-dredging has not been practised?—No, certainly not.

208. The dredging now is scooping?—I should think that there has never been any dredging for years for the purpose of improving the navigation.

209. It has been merely a dredging to obtain materials?—Yes, irrespective altogether of the navigation of the river.

210. Have you formed any opinion as to the usefulness, or otherwise, of the present body of Commissioners?—I should say that in the upper part they have very much evaporated.

211. (*Professor Way.*) What do you mean by the upper part?—Above Oxford.

212. (*Chairman.*) You do not consider them useful?—Certainly not.

213. If they are not useful are they obstructive?—Certainly, because they still exist.

214. They are obstructive not by any will of their own, but simply by the fact of their legal existence?—Precisely so. That brings me to the very point to which I wish to call your attention, namely, the saving clauses in the General Drainage Act, which prevent the establishment of any board of Commissioners for drainage purposes where there is any river or canal under the management of a corporation, company, undertakers, or Commissioners by virtue of any Act of Parliament. No doubt the Act does say that the consent of the Navigation Commissioners is to be given, but the consent of a body which never meets, but still exists, is very difficult to be obtained. The Thames Commissioners divide themselves into districts, and it is doubtful, under this Act, whether the Thames Commissioners, whose consent is required, are the whole body of the Commissioners, or the district committee. There is another clause in the Act of Parliament, namely the 57th, which seems even to go further than the one I have read—the words are these: "Nothing in this Act shall be con- "strued to make liable to the control of the Commis- "sioners any river, canal, or inland navigation, or the "cuts, reservoirs, feeders, or other works belonging "thereto, in cases where such river, canal, or inland "navigation is now under the provisions of any local "or private Act of Parliament exempt from such "control." The landowners in the upper part are in a position which is by no means agreeable to them. We have the water kept up to a height which is injurious to our meadows, and we have not the power of dealing with that water at our own free will, or draining our lands, not even with the consent of the general body of parties interested, and my particular object is to induce the abandonment of the Commissioners' power to the westward of Ensham Bridge.

215. The Commissioners are required to meet at certain stated times by the Act of Parliament?—Yes.

216. Do they do so?—Certainly not in the upper district; practically they do not interfere at all in the upper part. I do not mean to throw any more odium upon the Commissioners than is absolutely necessary, because I think that they have done their duty as far as they knew how; but when parties have no funds their meeting is of very little use. They have practically abandoned the supervision of that part of the river above Ensham bridge.

217. (*Mr. Harrison.*) The river is in a bad state in that part in consequence of the shoals?—Yes.

218. In an Act of Parliament of George II. there is the following clause:—"And whereas it may be "necessary to cleanse, scour, clear, and ballast "the said rivers in many places; be it enacted by "the authority aforesaid, that it shall and may be "lawful to and for the said Commissioners, or any "seven or more of them, at any of their general meet- "ings, by any order under their hands and seals to "cause the said rivers, or such part thereof as to them "shall seem meet, to be cleansed, scoured, cleared, "and ballasted, and all obstructions and annoyances "in and upon the said rivers to be removed?"—Yes, but they have no funds.

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219. But it is the question of the power of the Commissioners to scour out the river?—My previous answer as to the right of dredging referred only to the part of the river within a certain distance from the city of Oxford.

220. Was not that included within the powers of the Commissioners?—There are very inconsistent rights, I believe, on the Thames.

221. Used the Commissioners to cleanse?—Since I have known the Upper Thames they have never done anything in it.

222. There was a committee of the Commissioners appointed in 1853 to examine the upper part of the Thames?—Yes.

223. And the remark of that committee is that "they "find all the evils of high floods much increased by the "negligence and inattention of the landowners and oc"cupiers themselves, who have in no observable instance "done anything towards keeping the natural channels "for the water open, but have, on the contrary, encou"raged their contraction by the growing of willow "boughs and planting every sandbank and deposit in "the river, for growing rods, and for the purposes of "fishing." The Commissioners there apparently seek to relieve themselves from the responsibility of keeping the river deep, and charge the blame upon the proprietors?—I know of no such duty on the part of landowners.

224. The consequence is that neither Commissioners nor proprietors look after the bed of the river?—Neither of them do it.

225. (*Chairman.*) Do you know of your own knowledge of any depreciation in the value of agricultural land by the flooding of the river?—Yes, on our meadows. At this moment we have a considerable quantity of meadow land in Northmoor parish. We are now going to a very large expense to improve those meadows, because we know that they are seriously affected in their value by the risk of summer floods; it is well known that water which comes on at irregular times spoils to a very great extent the character of the grass. The stock owners will not give so much for land which is liable to be flooded, because hay and grass grown off it is not so good for sheep and cows as it would be if the water was under control and only allowed to come on when it was desirable for feeding the roots of the grasses. We are engaged in the same work as was mentioned to you by Colonel Harcourt yesterday. We have a considerable property in that parish. I have been over the line which has been proposed for that drainage bank, and have altered it in various places, because it was found that it did not take in sufficient of our land.

226. Have you formed any notion as to the value per acre of the benefit of the embankment?—I am quite certain that the tenants would willingly pay six per cent. upon the money which we lay out.

227. Then if money could be obtained at 3½ per cent., and could be judiciously laid out under proper authority, the owners of property would, as far as you see, give their assent?—I should think that all who know their own interest would do so.

228. (*Mr. Harrison.*) Is it not the case that the summer floods are frequently occasioned upon those meadows by the system of using the water of the river for flashes?—I believe that is so. The floods upon the Thames are very uncertain in their action. I wish here rather to carry a little further Mr. Clutterbuck's correction of his own evidence which he made just before you adjourned last night. According to the experience which I have had here, and from information which I have received from various persons on the river, rain which falls in the immediate area, namely, the district here, does not very much affect the height of the river. Our floods come from the rain which falls upon the Cotswold Hills. The Windrush is a river which brings down a vast quantity of water and very rapidly indeed. It comes in at Newbridge, just where the college property lies. It is very much to intercept these waters of the Windrush that we are carrying out this great drainage operation at Northmoor.

229. (*Chairman.*) Are you acquainted personally or officially with any of the mills above and about Oxford, situate on the river?—No, there is no mill on the Thames above Lord Abingdon's mill.

230. Have you any experience of the injurious or beneficial action or any action, which the mills situated on the Thames or its tributaries in or about Oxford produce?—Below Oxford it is notorious that Sandford mill is a block to the water. Whether it is that the overflow is not so wide as it ought to be to carry off the water which finds its way there, or whether it is that the miller will not draw his tackle, as they call it, when the flood begins to come, I do not know, but it is certain that we find (and I speak this from an experience of every flood within the last ten years) that below Sandford the river is within its banks and above Sandford it is all over the banks. I am quite certain it is impossible to contradict that.

231. You are not aware that there is a supervising control of any sort over the miller at Sandford?—My own opinion is that he does exactly what he likes, and that he suits his own purpose as to how he deals with the water.

232. (*Mr. Harrison.*) If the flood water was allowed to escape by means of an overfall of sufficient length, instead of by means of tackle to be removed when a flood came, would not that be the best means of taking it out of the power of the miller to interfere? No doubt that would be a certain mode, but whether it would be the best or not I cannot say. There is an overflow at Sandford. The question, of course, is whether that overflow is of sufficient width and of the requisite height. Millers are very fond of putting a shifting board at the overflow, and by that means they frequently enhance the water to the injury of their neighbours. I have seen this again and again myself, and we know perfectly well that actions have been frequently brought for matters of that description. Sometimes millers have been compelled to reduce the height of their weirs, and at other times they have succeeded in showing that they were doing no more than they were entitled to do, having done the same for many years.

233. (*Chairman.*) Then the fact at present is that if the Commissioners have legal powers through their engineer or servants to restrain millers they do not exercise them as far as you know?—I should think that from the state of their funds they have done as little as they possibly could.

234. But in the event of any new conservancy commission or any new board being formed to manage the Thames, should the management of mills, if mills are continued, remain exclusively in the hands of the millers, or should it be vested in a competent authority who should have full power to fine the miller if he did not draw his shuttle at the proper time?—I think that the two, mill rights and navigation rights, are so inconsistent that it is almost impossible for them to co-exist. If you are to have a certain height of water for the purposes of navigation it seems to me that you must throw the millers overboard. Their rights are totally different. They want a certain water at certain times, and not at others, whereas the navigation is a thing which goes on from hour to hour, night and day. A boat must come as the trade demands it, whereas the miller works from sunrise to sunset, and he lets the water accumulate during the night.

235. (*Mr. Harrison.*) Is it not possible to have the reaches so regulated that they shall be navigable at all times?—I think not, with the rights of the millers, supposing that they use them as they now claim to do. I will not say that it is impossible to subordinate the rights of the millers to the navigation rights, and to have an effective control, but it seems to me to be a very difficult problem to solve.

236. At present millers have no right to reduce the water below the low-water level mark?—They say so.

237. Would it not be possible to prevent their lowering it?—If you have an officer of the Commis-

sioners or of the corporation, or whatever it may be, at each mill, it may be so. Otherwise millers will do it, and leave you to your remedy. I only speak on general principles. I am not an engineer.

238. (*Chairman.*) In the reach of the river, where the property of St John's College lies, are there any weeds and reeds and water plants growing ?—Yes; we have aits or flams of our own where we grow osiers. The river was at one time between the flam and the main land, but now it has retired. This is by no act of ours, the soil has grown upon us.

239. Do the Commissioners exercise any jurisdiction as to the extent to which reeds and osiers and other plants which will grow in water, and become liable to obstruct the river, are allowed to grow ?—Never to my knowledge above Oxford.

240. Supposing that any riparian proprietor chooses to let osiers and weeds and reeds grow as thickly as nature may provide, is there any controlling power to step in and say that he shall cause them to be cut down ?—I know of none.

241. Then you have no master over you to tell you to cleanse your portion of the river, or to do anything with it other than you think proper ?—We have never seen one.

242. Do you think that with a properly constituted authority that would be part of its duty ?—As my object is the drainage of that district and not navigation, I should not object to any drainage commissioners exercising an authority of that description, but I strongly object to any attempt being made to force upon the upper proprietors anything like a navigation commission.

243. Have you formed any idea as to what kind of body would be competent to manage the river for the future ?—I should divide the river into sections ;—I find that that has been done in the river Nene, which passes from Northamptonshire out to Wisbeach. Some years ago districts were formed on that river. It has not been a very successful operation, and I believe that the outfall expenses have been so heavy that at last it has fallen into other hands, but there I find that districts were made. Upon a certain portion I believe there was navigation. At other portions they had drainage works, embanking, and warping. My impression is that there ought to be a board of drainage commissioners for the upper part of this river, say from Lechlade to Ensham Bridge, or probably Oxford would be a better terminus, with power to make a sufficient cut to join Ensham with the King's weir as a canal.

244. (*Mr. Harrison.*) Is there any canal at Ensham? —No, the river comes to Ensham—there is a canal from the Duke's lock, and there is a trade, as I have mentioned, from the Duke's lock to Ensham. From Oxford below, until the boundaries of the jurisdiction of the Conservancy, there should be another body empowered (if it is found that there is traffic sufficient for the maintenance of a navigation below Oxford) to make such rules as should be necessary to keep up that navigation, and it should also have under its charge the drainage of that area, for I think that the drainage of a large valley like the Thames is hardly secondary even to the navigation of the river. When you get to the district of the Thames Conservancy it seems that there is trade enough to keep the river in a very efficient state. There is a great number of towns upon the banks, and the Conservancy might be well left alone; but I have no desire to see their power extended up this way.

245. (*Professor Way.*) How many sections would there be ?—Three ; the first above Oxford, the second from Oxford to the boundary line of Thames Conservancy, then the Thames Conservancy district.

246. (*Chairman.*) Have you formed any idea as to the mode of electing or appointing those conservancy boards ?—As regards the upper part, from Lechlade to Oxford, I should say that as drainage would be the object, the body should be elected by those who are directly interested in the drainage, in fact I should desire a special Act, similar to the Drainage Act, but with more effectual powers.

247. Would you give the central power authority to nominate an officer to superintend the operations of these local boards, or to cause an annual, or quarterly, or any other inspection ?—If it could be avoided I would rather that we had no Government interference or control; but it is possible that where there are different boards like these it should be desirable to have some supervision—but it should only be a supervision.

248. With a supervision, or even if you stopped short of a supervision, would you consider it proper to allow an appeal by aggrieved parties from the local to the central authority ?—I suppose you mean in the same way as the Board of Trade exercises control over railways.

249. (*Mr. Harrison.*) And as the Admiralty exercises control over harbours ?—I should not myself object, but I have no doubt that other people would object, to any Government interference.

250. (*Professor Way.*) Then you would not look for any Government help ?—Certainly not.

251. (*Mr. Harrison.*) In the old Acts of Parliament power seems to have been given to do things without responsibility ?—That is usual.

252. Is it desirable ?—I would rather not answer that question.

253. (*Chairman.*) Do not you think that it will be necessary, before you can put the Thames, its mills, its navigation, and its drainage into a proper condition, to look, in some way or other, to the State for a grant out of the public purse. If so, will it not be right that Government should do as it has done in Lancashire, follow the loan with some supervision to see that public money is not wilfully wasted. The same thing has been done under the Drainage Commissioners and Improvement Commissioners in Ireland ?—I have always confined my attention as far as I could to the upper part of the Thames. Below Oxford, where you have to keep the water for the purpose of navigation, it might be a very great matter whether the Government should not interfere and grant a loan. About that I express no opinion. But according to my own judgment I do not see that the works above Oxford are of a sufficient character to require any loan from Government—they could be done well enough by the private riparian owners. Of course, if Government would lend us the money at 3½ per cent., we would rather borrow from them than from the companies, who charge us 4½ per cent.

254. If you could get money at 3½ per cent., such as has been granted in Lancashire, about five guineas per cent. would repay the money in thirty years ?—Yes, the cheaper the landowners could get their money the greater facility would it afford to them to carry out proper improvements; and if we go to Parliament or to Government for a loan I think it is but reasonable that Government should have an inspection to see whether we are expending the money properly—I do not want to have one shilling which we do not expend properly.

255. Are you aware that in the Land Drainage Acts Government has gone the length of dictating what the works should be ?—Not practically. Government sends down its surveyor, and the surveyor asks you for your plans, and if he sees that your plans are feasible and proper he allows you to carry them out.

256. With regard to the proposed improvements for the Thames, would you object to that course ?—Certainly not, if we go for a loan.

257. Would you wish anything further than a repeal of those clauses in this Land Drainage Act which prevent its operation in the case of rivers managed by a navigation commission ?—Yes, the Act of 1861 requires simplifying very much indeed. It was passed at a very late period of the session ; and it was well known by those who had the drafting of it that it required serious amendments; it is very defective.

258. You mean that there are deficiencies in the Act, if applied to the drainage of any river valley, not only the Thames valley ?—Yes, I can say the same

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of the Thame. We have property upon the Thame which runs in at Shillingford Bridge. I should there be very glad to assist in making a board of drainage commissioners, but the machinery of the Act is so cumbersome that it cannot be done.

259. (*Mr. Harrison.*) Would you include the branches under the same commission?—They are so very wide that it would hardly be possible. The Evenlode and the Windrush come a very long way. I think that if the Thames had a set of drainage commissioners, each of the affluents would very soon have one also.

260. (*Chairman.*) Do you see your way at all to a material improvement, if the Commissioners and the proprietors of the navigation, of fisheries, and of mills are left to themselves without the intervention of Parliament?—I do not. My opinion is that it will be necessary to remodel the Thames Commission.

261. Who is to remodel it?—Parliament must do it, of course. If the commissioners had had money of their own I have no doubt that they would have themselves gone to Parliament for the purpose of remodelling their constitution, because their body is too large and too complicated, but they are so completely without funds that they can do nothing. I can see my way to independent bodies being established who shall exercise proper jurisdiction over the Thames and its tributaries, and take up all its multiplied interests without the fetters of what is called centralization. For the district extending as far down as Ensham or Oxford, I mean the district in which navigation shall cease (for that I always look upon as a great point), I think that Parliament might well be asked to pass a compulsory Act calling upon the proprietors of the different parishes to appoint a drainage commission. This drainage commission when appointed should have sufficient power to exercise proper jurisdiction over that part of the river. I have formed no opinion as to what is to be done with the lower part of the river. I am not sufficiently acquainted with the requirements of the trade nor of the localities to give you an answer.

262. (*Professor Way.*) You would deal thus with the part of the Thames above Oxford, irrespective of the part below?—Just so.

263. And you would propose either that the Land Drainage Act should be amended with additional provisions, and that the proprietors in the valley of the Upper Thames should have power to take advantage of it, or else that there should be a special Act of Parliament passed, being a compulsory Drainage Act for the part of the Thames above Oxford?—That is my view. I do not think that we ought to be left alone above there simply to do as we like, when we may be doing a great deal of injury to ourselves and to our neighbours.

264. (*Chairman.*) You know that the ordinary course of human nature is, that one person is willing to benefit himself by a useful work, but that the next proprietor, although you may show him ever so clearly that he would be benefited by joining in that work, will, nevertheless, not join without compulsion?—That is so, but we have had a sort of experience upon this matter. The late Mr. Woolley, who was as shrewd a man as ever came to this district, was the person who devised the first scheme of making these flood water banks, and they have been very successful. Standlake, from having been known to be one of the most unhealthy places, with a great quantity of water over the fields, and with very bad cultivation, is now known as being under very high cultivation, and the health of the place is very much improved. At Brighthampton, in which we have very large property, the same has been done, also at Chimney and at Stanton Harcourt, and we are now going in for a bank six miles long between Ensham Bridge and Newbridge. That shows me that at any rate in this upper district the landowners are appreciating the value of drainage as connected with the river Thames. In addition to this you have been told about Mr. Campbell, who has done a very large quantity of drainage in his neighbourhood. I am quite satisfied that in a little time and with some energy owners of land abutting upon the Thames would come into some general scheme, provided they were free to act without any interference on the part of persons who have not the same interest as they have.

265. (*Professor Way.*) And would they be prepared to compensate existing interests?—There are no existing interests in that upper part, it is a peculiar place because we have no mills; if we had mills to buy, the question of compensation would be a very serious one.

266. (*Mr. Harrison.*) What is the distance from Oxford to Lechlade?—About 33 miles.

267. (*Chairman.*) We will now come to Oxford proper. You are generally acquainted, I presume, with the city of Oxford?—Yes, I am a town commissioner, and I was a commissioner under the old board.

268. You are acquainted to some extent with its existing sewerage?—Yes.

269. Do you consider it a good system or an imperfect system?—Very imperfect.

270. Will you describe as briefly as possible why it is imperfect?—It is imperfect for this reason: our old Act of Parliament gave us no outfall, our district was a very circumscribed one, with no means of discharging the sewage out of it. We could not execute an inch of work beyond the area over which the commissioners' power extended; besides which we had no power to borrow money, and you cannot execute main works out of annual revenue; you must capitalise that revenue, do your works, and pay the money back. I urged the commissioners some four or five years ago to go to Parliament to get a special Act, and I pointed out to them that it was utterly impossible for us with our limited powers to do our duty towards the city. The majority of the commissioners thought that it was desirable to wait until it became a matter of necessity to adopt the Local Government Act, which was then on the eve of being passed, rather than go to Parliament for a special Act, which would cost a considerable sum of money, and might cause great confusion. The result was that my proposal was rejected; but last year I concurred in the adoption of the Local Government Act, and we are now taking the earliest opportunity of getting an efficient drainage for this important city.

271. Can you tell me where your principal sewer or drain outlets now come into the streams?—One comes in at the head of Christchurch meadow just by the great boat builders, Salter & Company; the other main sewer discharges itself at Magdalen Bridge under the Botanical Gardens into the Cherwell.

272. Is it a cause of nuisance?—Continually. There is another sewer discharging itself in another branch of the Cherwell on the opposite side of the valley; that sewer brings the sewage matter from St. Clement's district.

273. (*Professor Way.*) Frequent complaints are made?—Yes. In fact we are committing as great an outrage as can be in discharging the mass of sewage into the two streams, the Cherwell and the Isis, which really form one, because they unite immediately below Christchurch meadow, and we are contaminating the river to an enormous extent.

274. (*Chairman.*) Do the town authorities or any of the college authorities attempt, so far as you know, to cleanse the surface of the Thames. Supposing that putrid dead dogs, or cats, or other garbage float on the surface of the water, is it any person's business to remove them?—No, I know of none. As commissioners we have frequently dredged out the Cherwell about the parts where the sewers discharge, and what has been there has been taken away.

275. But there is no constituted authority, so far as you know, whose business it is to scavenge the Thames as you would scavenge the street?—I never heard of one. There are penalties, no doubt, for throwing offal into the Thames, but there is no health officer as connected with the Thames to see that offal is not thrown into the river.

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276. You are aware that all the sewage of Oxford passes into the river?—Yes.

277. And of all other towns—the whole sewage of the towns situated upon its banks?—Yes, without deodorization.

278. You are aware that carrion floats in it?—Yes.

279. That dead dogs and cats are thrown into it, that human beings bathe in it?—Yes.

280. And yet that that water goes down in that condition and is pumped up for the supply of London?—Quite so.

281. Do you think that that is a state of things which can continue?—The wonder to me is that when the water arrives at Hampton Court it is so pure as it is.

282. Are the commissioners not contemplating the carrying out main sewerage works in Oxford?—Only yesterday a meeting of the commissioners directed the clerk to deliver notice for the outfalls of the sewers, and to take the land under the Lands Clauses Act. From the moment that the Act came into operation we began that most important subject.

283. Is it contemplated by the commissioners to sewer Oxford and pass the sewage into the Thames at a lower point, or to pass it on to land?—It is contemplated to sewer Oxford thoroughly, and it is desirable, if it can be effectually carried out, that that sewage shall be applied to agricultural purposes, provided always that there is an area sufficient for it. I am quite certain that the great majority of the commissioners have not the slightest intention of turning the sewage into the water at the outfall where it is to be collected in the state in which it leaves this town. What the operations will be I cannot at present say.

284. Will the contemplated outfall take you below any existing weir or mill?—The contemplated outfall, subject to the approbation of Mr. Bazalgette, is at Sandford.

285. Above or below the mill?—Below the mill; and I heard from Mr. Harcourt yesterday that if we create a nuisance there, we are certain to be checked by the riparian proprietors.

286. Have you any idea that you will meet with difficulty or opposition from the owner of the mill for obstructing such portion of the water as will fall below his tail race, or rather above his mill end?—I think that we shall risk that.

287. (*Professor Way.*) What is the population of Oxford?—Within the area now drained by Oxford I should think that it is about 32,000 to 34,000 people.

288. (*Chairman.*) With a contemplated addition?—Certainly.

289. Of what?—It may be 4,000 or 5,000 people. I daresay that we shall get 40,000 people in ten years.

290. (*Mr. Harrison.*) We heard yesterday from Mr. Harcourt that twice a week a great nuisance was occasioned from the paper mills at Sandford. There are paper mills in Oxford at Folly bridge, and up above at Wolvercot. If there is a similar discharge from these paper mills one would suppose that you would be aware of it in Oxford?—I think that a great deal of the discharge at Sandford comes from the making of colored papers, and that a discharge from a manufacture of white paper would not be so injurious.

291. You are not aware of any nuisance at Oxford?—No. I know of no nuisance which we can immediately trace to Wolvercot mill.

292. (*Chairman.*) Oxford is supplied with water?—Yes, partially.

293. How is the water obtained?—By an engine at what they call the Railway Lake, which pumps it up to the level of the town and distributes it in the various streets.

294. Is it the river water?—My opinion is that it is the river water. The railway company excavated that lake for the gravel to ballast the line, and it was found that a large quantity of water collected there, and it was considered a good plan for the city to use that water for its purpose. I have no doubt that the main part of the water comes through the pervious bed of the river. There is a bed of gravel varying from 18 to 24 or 25 feet thick. There is also a certain portion of the water very likely coming down from Hincksey Hill.

295. (*Professor Way.*) Is the water considered good?—Yes.

296. Is it hard?—Yes, it is hard tried by the soap test, but I never found any Thames water which was not hard.

297. (*Mr. Harrison.*) If the water in that reservoir was supplied from the Thames would it not rise and fall more or less with the Thames?—It does so; it is affected by the Thames.

298. This morning I walked across the reservoir, and I observed the reservoir not anything like full below the pipes, whereas the Thames in the adjoining field was all but overflowing?—That will be the case for a certain time, but the reservoir will recover its height of water. The water will get in in time. I have no doubt that the water in the reservoir does not come from the body of the Thames proper so much as from that part which is stagnant over the meadows. It is not at all impossible that in many places there may be an impervious bed, from the deposit of the lime and chalk on clay and gravel forming a certain sort of compost.

299. (*Chairman.*) Are there private pumps now in use in Oxford?—Yes, many.

300. Water is got with facility from the subsoil?—Yes, after you pass Carfax on the upper level and come to the ridge running between the Thames and the Cherwell; if you dig down there 18 or 20 feet you come to water.

301. (*Mr. Harrison.*) What do you dig through?—What we call shuff gravel. It is the deposit of the two rivers many years ago.

302. (*Chairman.*) Are there any portions of the city proper, its houses, its cottages, or its colleges, which are inconvenienced by the Thames at high flood?—Yes, the low parts of Oxford are very much affected by the floods.

303. Where? — At Friars and down towards Oseney Newtown, and all along that bank, and parts of Jericho; but I do not think that Jericho is affected by the river, because between the river and Jericho is the canal. My own impression is that the floods in Jericho come from the water that falls on the gravel formation which comes out to the lower parts of that district, and commissioners are going to run a sewer along the lowest level which I believe will take every drop of surface water which there is in that district, and I have no doubt will also very materially affect the wells.

304. Is Oxford or are the meadows in the vicinity liable to fogs?—Yes. I very frequently drive down Cumner Hill and across the Seven Bridge Road, where we come across the greatest districts of meadows from Botley into Oxford, and I can always recognize the greater cold of the fog.

305. There is a road from the Great Western Railway up into Oxford, and you pass by a depression underneath one of the railway bridges?—Yes.

306. Is it ever flooded?—Yes, I have been obliged to go over the railway. In order to meet that difficulty the railway company were compelled to make a level crossing which is a very dangerous one. That depression of the road has always been a source of very great annoyance to the inhabitants of Oxford. It is always a nuisance, it is never free from water, sometimes so high that a horse cannot get across it. When there is a flood in the river the water makes up, and must always be pumped out, and if the company's servants are careless with the engine or do not put it into full work the road is stopped.

307. I think that I have myself seen that road four feet deep with water?—I have no doubt of it. I have come to the opinion that a great number of these obstructions in the river are caused by the constant irregularities of the height of the river. There is no compulsory drawing of the weirs, and each owner

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keeps up the weir according to his own view. Of course the result of that is, that for a time, if there are no flashes, you get places growing up, and if there is a little deposit weeds will grow in a very short time, and they then act as strainers of every bit of silt coming down. Thus large deposits are made, osiers are afterwards grown, and my opinion is that the blocking up of the channel, which has been so much complained of, is in great measure caused by the weirs and the locks which are kept up at different points. I also think that the weirs and locks create floods. I believe that if we had the river in a state of nature, with some supervision, so as to prevent these zigzag courses which have been mentioned, and without obstruction from navigation works, the rain which falls upon the different areas would be sent into the river and pass off without the immense floods we have here, for England is not a country where an enormous quantity of rain falls at any particular season. We have it very fairly distributed over at least eight or nine months in the year.

308. (*Mr. Harrison.*) Some of the rivers coming down about Oxford pass for a considerable distance over the Oxford clay, and some of them rise in the upper lias and pass over the lias for a considerable distance ?—Yes, I believe so.

309. Passing over those clay lands do they bring down a large quantity of silt with them ?—I think that the silt is stopped by the mills in transit. The Windrush is a clear running river generally. It comes down brown when it comes in flood, that I take it is the stone brash brought down. I do not know sufficiently of the Evenlode, it comes in a very different way into the Thames. The Cherwell is so intercepted by mills the whole of the way from here to Banbury that all the silt from the formation through which it has passed must have been lost.

310. (*Professor Way.*) I understand you to say that you propose to deal with the upper part of the Thames above Oxford separately from the rest of the river ? —Yes.

311. And to deal with it as a drainage scheme?—Yes.

312. Supposing that in the second section of the river it should be decided to keep the mills and locks and weirs as now constituted, how could you carry out your drainage scheme ?—Of course there would be some difficulties. We should pass down all the water as it came to us. The lower owners must deal with the water when they get it.

313. You have mills immediately below Oxford which, not being within your jurisdiction, would be competent to keep your water up. You would not have the free course for the water which you would wish for ?—If we ended at Ensham we should.

314. Do you not think that it would be possible to obtain all the advantages of the drainage conjointly with navigation and possibly with the mills ? — I think not. I cannot at all see my way to the three parties working amicably together. I think that their interests are so extremely inconsistent that they would only jar. Whichever interest was the primary one would always be interfering with the others. If the navigation was the primary object landowners would have to bear floods, and mills to work with short water. If mills were the primary object millers would keep up the water and flood their neighbours. If drainage was the primary object then the navigation would be flooded, and mills would get the water when it happened to come, and at no other time.

The witness withdrew.

The Rev. RICHARD GRESWELL, B.D., F.R.S., examined.

Rev. R. Greswell, B.D., F.R.S.

315. (*Chairman*). You have had considerable experience in connexion with Oxford ?—I am of nearly 50 years standing as a member of the University.

316. Are you acquainted with the river Thames and its tributaries flowing through and in the district of Oxford ?—Through Oxford, but not to any great distance beyond Oxford.

317. What are the tributaries of the Thames which flow in and through Oxford ?—Practically, as far as flooding of Oxford is concerned, it is only necessary to take into consideration the water which is brought down by the Isis on the western side of Port Meadow. The Cherwell is much smaller in volume and does not join the Isis till below Oxford.

318. Do you remember at what date you first began to pay attention to the flooding of Oxford ?—It is about five years ago that I saw that Port Meadow was in a hopeless state of neglect. The river had been allowed in the course of the last 50 or 60 years to destroy 20 acres of land without any attempt having been made to prevent it. Those 20 acres are now represented by 14 acres of mud. I had the mud accurately measured, and a plan which has been made of the river shows all the acres of mud laid bare on those days when there is not a flash. The whole of Port Meadow, instead of being any advantage to Oxford, has been an absolute nuisance to Oxford. In the first place, it was not available for recreation because it was soft and swampy for nine months of the year, in fact never dry except for about three months in the year, towards the middle or the end of the long vacation ; therefore Port Meadow was of no practical benefit to the citizens of Oxford or the members of the University. In the next place, it was the cause of great injury to the healthiness of Oxford, because half of it (200 acres) was in a soft and swampy state through the whole of the year. From those 200 acres, which are a million square yards, malaria to a very great extent has always been generated, especially in the spring and early summer, and at this time of the year there are fogs.

319. Does Port Meadow belong to the college with which you are connected ?—It belongs to nobody ; at least, it is doubtful to whom. The right of pasture belongs to the freemen of Oxford, but it is a matter of dispute between the corporation and the freemen as to whom the meadow properly belongs—it is public land.

320. What is its area ?—It is not quite 400 acres, but I believe more than 375.

321. Then Port Meadow is a common ?—Yes.

322. It is subject to common rights enjoyed by the freemen of Oxford and by any of the colleges ?—The tenants of Christ Church, St. John's College, and Merton College have the right of turning certain cattle on it, by reason that those colleges have lands adjacent.

323. Previously to anything done by you was Port Meadow liable to be laid under water ?—There were three causes which made it a matter of absolute necessity that the whole of the lower part, and much of the upper, should be liable to be flooded all through the spring and early summer. In the first place, there was no outfall excepting to the river, which is adjacent to Port Meadow, and which is ordinarily on a level with the surface of the meadow. Secondly, there was no embankment to prevent the water coming upon the meadow. And, thirdly, the channel of the river on the western and southern sides of Port Meadow had been completely filled with soil brought down from the northern part of the meadow ; the soil had deposited itself above Medley Lock and between Medley Lock and Walton Well. I expended 250*l.* in clearing the soil. On two occasions, when the season was particularly favourable, I employed 30 men for more than two months—first, in clearing the bed of the river between Walton Well and Medley Lock, and then in clearing away a vast mass of soil 300 or 400 yards long, and extending entirely across the river. This mudbank formed a permanent dam to the river, so that the river had been obliged to work for itself a fresh passage round it. You will thus understand how it was that the smallest quantity of rain falling in Gloucester-

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shire was sufficient to raise the level of the water in the river above its left bank. Floods used to take place ten or a dozen times in the course of the year, and in consequence the meadow was kept in that swampy state all through the year.

324. It being five years since you first turned your attention practically to remedying existing evils, by what authority, legal or otherwise, did you take upon yourself that duty?—The Oxford council gave me their authority. Everything which I have done has been done in the name of five successive sheriffs.

325. And you provided the funds for performing the work?—I did; it cost me some 600*l*. My friends have given me about 100*l*., but I am intending by-and-by, when the work is completed, to make an appeal for a subscription, both to wealthy citizens and to the University and to colleges and to individual members of the University.

326. Then you mean that so far you are personally out of pocket by the improvements executed upon Port Meadow?—To the extent of about 500*l*.

327. You have done it rather as a work for the benefit of the public at large?—And partly as a work of charity to find employment for the poor of Oxford at the end of the long vacation, for the work can only be done with advantage when the river is nearly dry. The money which I have expended has produced benefits which would be cheaply bought for 50,000*l*.

328. Is there any legally constituted authority which could have been compelled to have executed the work, if you had not taken it upon yourself?—No.

329. Is there any legally constituted authority which could have stopped you from executing these works?—Different attempts have been made by a few individual freemen to stop me, but it was not clear that they had any authority.

330. Will you describe to the Commission the kind of works which you have executed?—There were those three causes which I have stated why Port Meadow was flooded, and I have completely cured all three, and therefore it is just as certain that Port Meadow never will be flooded by any summer floods as before it was certain that it should be flooded. The first thing I have done is this: I have provided an outlet for the Port meadow water into the river below Osney lock at a distance of a mile and with a fall of more than six feet. This outfall I have been able to realize by means of iron pipes laid under the river in two places, and by taking advantage of an open cutting between the two railways, and of a culvert a yard in diameter and 525 yards long, running near and parallel to the Great Western Railway. In this manner I am able to drain Port Meadow dry to the depth of 2 feet 6 inches below the lowest part of the meadow, excepting of course during a winter flood.

331. What is the size of the drain pipes which you have laid in?—They are only 10-inch pipes. I should have preferred them to have been 12-inch pipes; but unfortunately the Great Western Railway Company, when they connected the broad gauge with the narrow gauge, during the long vacation, when I was absent, adopted a 10-inch pipe. However, this 10-inch pipe is found quite sufficient for the purpose for which it is intended. It is not intended to carry off the flood water; all that it has to do is to drain off the water from the ditches and the water which comes in by percolation, and that it can do perfectly.

332. If the 10-inch pipes do it perfectly, why should you prefer 12-inch pipes?—The 10-inch pipes answer perfectly, except at such an extraordinary time as the present. They have kept Port Meadow completely dry through the year; but in the last two or three weeks we have had an unprecedented quantity of rain falling upon Port Meadow itself. On Sunday week the fall of rain amounted to an inch and a half. All this rain falling upon 375 acres had to be carried off by these pipes, and may raise a small quantity of water just at the corner for a few days, but that is all; no water has come in from the river.

333. What is the second means you have adopted?—An embankment extending along the south and the south-western sides of the meadow, and a cleansing of the channel of the river.

334. Then you have not so dealt with Port Meadow as to prevent flooding under any circumstances?—I have made a distinction between summer and winter floods. It is of great importance that Port Meadow should be protected from summer floods, and that is done; but when a winter flood comes we invert the problem, and we invite the water on Port Meadow and keep it there for the purpose of protecting all the low parts of Oxford.

335. Then, if in summer a flood was thrown down the Thames equal in volume to a winter flood, Port Meadow would be flooded in summer in spite of all that you have done?—Yes, if such a flood came, which perhaps happens once in 10 years; but if it did come it would be very desirable that it should be kept on Port Meadow, where it will do little or no harm, rather than on the lands outside, where it will do an incalculable amount of mischief.

337. (*Mr. Harrison.*) How long do these floods continue?—They are variable, generally about a week; but last year we had a very protracted flood of more than a fortnight's duration.

The witness withdrew.

Mr. J. Bossom.

Mr. John Bossom examined.

339. (*Chairman.*) What are you?—I am a lock-keeper to the Thames Commissioners.

340. At what lock?—The Medley lock.

341. How long have you been there?—I have been a servant to the Thames Commissioners 23 years.

342. What class of boats pass through that lock? what are the dimensions of your lock?—It will take a barge through; it is a lock with sluice-gates, not a pound lock; it is not a lock, it is a weir.

343. (*Mr. Harrison.*) Is there much traffic upon that part of the river, between Oxford and King's weir?—No, none at all.

344. Then why do the Commissioners keep a lock-keeper?—Because there are two flashes a week.

345. To enable boats to go out of the canal into the river?—Yes.

346. Above your lock, between your lock and King's weir, do any small boats go—pleasure boats?—Very few.

347. Is there any difficulty in their going?—They cannot go because there is no water for them to go.

348. Is that the only navigation between Oxford and Ensham; I mean if a barge was wanted to go, say from Sandford to Ensham, must it get into the canal at Oxford, and get out of the canal again above King's weir, and so go up the river to Ensham?—Yes.

349. So that there is part of the Thames navigation which cannot be used by the boats?—They cannot get up at all.

350. How long has that part of the river been in that condition?—I think 12 or 14 years ago boats used to come down to Oxford.

351. Had you then better water than you have now?—Yes; and we had the gates more open, but now there being no navigation the channel is all growing up.

352. What is the bed of the river which is so easily moved?—It was gravel at one time, it is now all mud.

353. Were any steps taken in former times to dredge the river by the Navigation Commissioners?—No, nothing was done; the working of the barges was sufficient to keep the river clean when there was plenty of trade.

354. (*Chairman.*) Do you think that you could get the river again into a navigable condition by working the barges, and without any dredging?—Yes.

355. You now maintain this Medley lock for flashing purposes?—Yes.

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356. How frequently do you use the flashing power?—On Mondays and Thursdays.

357. Do you give more than one flash in the 24 hours, or only one?—After we have drawn on Monday night we pen again, and then sometimes the millers complain.

358. It takes you from Monday to Thursday to pen up the pool to get another flash?—Yes, and even then sometimes we cannot make a flash.

359. Who asks you to give the flash?—We know the flash days and we have always got water there.

360. Do the bargemen pay you anything extra?—No, not me, but sometimes two mills are shut down, and then the bargemen have to pay for the water to the people at the fishing weirs up above my lock.

361. Do those flashes ever do injury to the adjoining land by flooding?—No, we have not enough water on to do that mischief.

362. (*Mr. Harrison.*) You have never known such a case upon the river?—No, not in our river, but I have heard of cases in some of these narrow streams.

363. (*Chairman.*) Is your lock out of repair at present?—Yes, it is in a very bad state.

364. To whom do you look to repair it?—To the Commissioners I think.

365. Have you reported it to the Commissioners?—I think that they know it very well.

366. (*Mr. Harrison.*) Do you know Mr. Greswell's works at Port Meadow?—They have done a great deal of good.

367. Would Port Meadow have been flooded by this flood to-day if nothing had been done by Mr. Greswell?—Yes.

368. Whereas the meadow is now nearly dry?—Yes.

369. (*Chairman.*) Do floods in the river flow over the adjoining land more now than they did when the navigation was in work?—Yes, of course they do, because the bed is grown up.

370. (*Mr. Harrison.*) So that the effect of the neglect to keep it in a proper state is to increase the flood opposite Port Meadow?—Yes, it throws the water over the meadow.

371. (*Chairman.*) What do you think it would cost to repair your lock?—I cannot tell.

372. (*Mr. Greswell.*) I was lately at an expense of 10*l.* in making it water-tight with cement.

373. (*To Mr. Bossom.*) Are you troubled with refuse discharged from the University paper mill?—A lot of stuff now comes from there. The stuff kills crawfish, and other fish as well. The stuff sometimes comes up as black as ink.

374. (*Mr. Harrison.*) How often is that?—All the summer.

375. Does the water smell badly?—I do not know about that, but there is a lot of black stuff.

376. Do you know at all whether, when barge owners purchase the water from the people above you, they consider that they have a right to that water of the river?—Yes, they say so, they pay for it.

377. How is it when they come down to a mill below; do they still think that they have a right to that water?—The millers grind night and day as long as the water lasts, and the next day there is no water at all.

378. When the water comes to the mill, if it is not above the high-water mark, the miller cannot be made to forward it, except through his mill?—Quite so.

The witness withdrew.

Very Rev. H. G. Liddell.

The Very Rev. H. G. Liddell, Dean of Christchurch, examined.

379. (*Chairman.*) You know Oxford and its suburbs very well?—Yes.

380. Have you paid any attention to the flooding of the lower part of the suburbs of Oxford?—I cannot pretend to any very exact information upon the subject, but I have taken great interest in it, and at one time endeavoured to organize means of relieving the valley from floods.

381. A considerable area of land, for instance, Christchurch meadow, is occasionally laid under water?—Yes, completely so, persons go over it in boats and skate upon it in the winter. It is surrounded by a raised walk. I have seen the water running over from the Cherwell into the meadow over that raised walk. In February 1864 it was within a very few inches of running over, though the walk had been raised.

382. Is any nuisance now experienced from the emptying of sewage into the river?—The chief nuisance is in the summer, when the water is low. But on this point I cannot speak from personal knowledge, as I am not at Oxford at that period of the year.

383. Certain improvements have been made in the streams running parallel to Christchurch meadow. The banks have been walled, and the streams also deepened?—Yes, some gravel has been taken out for the buildings.

384. Has that been done in any way with the view of getting rid of this nuisance of the sewage?—Not the least. The builder was allowed to take the gravel from the bed of the Cherwell.

385. I believe that it is contemplated to lay out a new system of sewerage for the whole of Oxford and its suburbs. Have you heard anything of that?—Yes, I know generally the proposed direction of it.

386. I may take it for granted that the college authorities will fall in with any general system of sewerage which is for the benefit of the whole district?—I feel no doubt of it. They propose to cross our land with one of the main sewers.

387. As far as you are concerned, I suppose that there will not be any opposition to their doing so?—I do not expect any. We, of course, shall wish to be satisfied that they keep below the surface. The walks are kept up for the benefit of the public at a considerable expense, and it would be a pity to disfigure a meadow of that sort without necessity. The Dean and Chapter of Christchurch keep up those walks.

388. I believe that you have paid some attention to the present condition of the river Thames, the dilapidated state of its navigation works, and the flooding of the adjoining lands?—Yes, I was one of those who signed the memorial in 1860 and 1862.

389. Out of which this Commission has perhaps grown?—Yes, very likely; the object of that memorial was to obtain such a commission.

390. Have you formed any opinion as to the reason of the flooding of Christchurch meadow?—There is a ditch around it which is connected with the Cherwell and the Isis by sluices. Though those sluices have been kept shut the water still comes in to the meadow. We suppose, therefore, that water from the Cherwell must percolate through the gravel.

391. (*Mr. Harrison.*) Does the water rise within the walk to nearly the same level as the river?—Yes, I think so.

392. (*Professor Way.*) The flooding of the meadow, I suppose, is after the real flood has risen in the river?—Yes, I think so.

393. (*Chairman.*) With regard to the navigation and rights of fishing and mill rights upon the Thames, have you formed any opinion as to what it would be necessary to do to bring the river back to a wholesome condition of management?—In the year 1857 a large body of persons united to take up the question, and a committee was formed under the organization of Mr. Philip Pusey. We took the opinion of Mr. Crossley, now the resident engineer of the Midland Railway at Derby, and he advised us that the mills need not be removed, with the exception of a few, for that an engineering scheme to prevent any evil from them might be devised.

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394. (*Mr. Harrison.*) Did you see any way of providing the money to effect those alterations?—We proposed to make use of the Sewers Commissioners' Acts, and to raise a rate for the drainage area, but after proceeding some length we were stopped by the 61st sect. of the Act for creating Commissioners for Sewers, 3 & 4 Will. 4. c. 22. The words are: "Nothing "in this Act contained shall extend or be construed to "affect, alter, abridge, or interfere with any navigable "river, canal, port, or harbour under the management "or power of any commissioners, trustees, or pro-"prietors by virtue of any local or private Act of "Parliament." And we were advised that that clause prevented us from doing anything whatever.

395. What district of the river had it been proposed to place under a sewers commission?—The district from Lechlade down to Sutton.

396. (*Chairman.*) Was any attempt made to get the consent of the existing commissioners for the Thames navigation?—Yes, and their consent was given, but it was thought that the Act restrained us from doing anything, whether with or without their permission. Being thus advised that we had no power to act for ourselves, we presented to the Home Secretary the memorial I have referred to.

397. (*Mr. Neate, through the Chairman.*) Was any estimate made by that committee of what it would cost to acquire power over the mills?—Mr. Crossley did not think that it would cost much, because he did not think that the alterations would injure their rights.

398. (*Chairman.*) Did he propose to restore the navigation?—He proposed keeping up the locks.

399. At that time that was not out of the question; they had not become in the condition in which they are now?—No.

400. Have you formed any idea as to what should be the jurisdiction to be established for the valley of the Thames?—Only let it be an effective and active one, exercising control over those who have the different sills, and mills, fisheries, and so forth, and it does not seem to me to make much matter in whose hands it is.

401. Then your experience leads you to this conclusion, that the existing Commissioners should be removed out of the way?—I should think so.

402. (*Mr. Harrison.*) Should not any new commission be formed of those who are personally interested in the maintenance of the river in a satisfactory state?—Yes, certainly, but they should not be too numerous; they are very numerous now.

403. The commission would then be composed of representatives from riparian owners, mill owners, and inhabitants of the towns upon the banks?—I should like to exclude mill owners as much as possible.

404. (*Chairman.*) Seeing that the area of the valley of the Thames is so large, if you only had one person returned from each interest, a board would be formed almost as unwieldy as the one you have now?—I should imagine so.

405. (*Mr. Harrison.*) Do you not think that if the river was put into a proper state the interest of mill owners would be identical with the interest of riparian proprietors?—Their true interest I daresay would be so.

406. (*Chairman.*) The object of the mill owner is to retain water and use it at his own will?—Yes.

407. And the object of the landowner is to pass it away from him as quickly as he can?—Yes.

408. (*Mr. Harrison.*) But is it not desirable for the landowner to keep up the water to a certain level below the surface?—Yes.

409. And I suppose that when the water goes over the land the mills are stopped?—Most of them.

410. (*Chairman.*) Do you think that in a new conservancy board Government superintendence would be objected to?—I should myself very much desire Government superintendence. I cannot say whether others would.

411. (*Mr. Neate, through the Chairman.*) Do you not think that the University should be strongly represented in any such board?—Considering the great use which is made of the river by the members of the University, I should think that the University should have a voice in it.

412. (*Chairman.*) In respect of its interest in the river, as affecting health, or as a stream used for purposes of amusement?—As regards purposes of utility, the University has the same interest as the city, but it has also a separate interest, by reason of the great use which is made of the river by the young men between Oxford and Sandford.

413. For purposes of pleasure and recreation?—Yes.

The witness withdrew.

Mr. John Galpin examined.

Mr. J. Galpin.

414. (*Chairman.*) You are surveyor to the Oxford Local Board of Health?—Yes.

415. You are a surveyor and civil engineer?—Yes.

416. Are you acquainted with the existing sewerage of Oxford?—Yes.

417. Is it efficient or defective?—Defective.

418. What are the principal outlets?—There is one at Magdalen Bridge, one at Hythe Bridge, and one at Folly Bridge.

419. Is the entire area of the city of Oxford sewered?—No.

420. Are there cesspools in any portion of the city?—Yes.

421. Are any of the colleges sewered into cesspools?—There is no doubt of it.

422. Do you know what becomes of the refuse, is it absorbed in the subsoil, or is there an overflow from the cesspools?—It is generally all absorbed in the subsoil.

423. (*Professor Way.*) The cesspools are not cemented?—No; in fact in Oxford what is considered the greatest essential for a cesspool is that the liquid should soak away.

424. (*Chairman.*) Are there wells sunk into the same subsoil?—Yes.

425. Is there any attempt made to prevent communication between cesspools and wells?—None whatever.

426. If the stratification admits of such communication it is free to take place?—Perfectly so.

427. (*Mr. Way.*) Is there a great number of wells?—A great number; in fact I should say that seven-eighths of the area of the city is perforated by wells for a supply of water for domestic purposes.

428. Is such well water still used for drinking?—Yes.

429. (*Chairman.*) The Lcoal Government Act has recently been adopted in Oxford?—It has.

430. Have you also recently added suburban areas to the area within your jurisdiction?—Yes.

431. Is there any sewerage in those suburban areas?—Yes; the suburban areas were more perfectly sewered than many of the internal parts within the old commissioners' jurisdiction.

432. Which area are you speaking of?—The Cowley district in the eastern direction.

433. Where do the sewers of the Cowley district empty?—Principally into the Cherwell.

434. Are you aware whether there is any complaint by residents in that district of the fouling of the Cherwell at any particular periods of the year by sewage?—Yes, in the parish of St. Clement's, which was originally under the jurisdiction of the old commissioners. The district which I am now speaking of discharges itself along the whole line of the Cherwell, bounding St. Clement's parish. There are several outfalls.

435. Have the commissioners given you any instructions since the adoption of the Local Government Act to lay out a new system of main sewers?—Yes.

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436. Have you made any progress in laying out a new system?—Yes, plans are now ready, and they are being submitted to Mr. Bazalgette for supervision.

437. Where is it contemplated to take the outfall?—That is not a settled question, but the principal outfall is contemplated to be below the Sandford Lock. The question as to the advisability of more outfalls than that one is submitted to the consideration of Mr. Bazalgette.

438. Has it formed any part of your instructions to look out for some means of utilizing the sewage before passing the water into the Thames?—Yes.

439. Do you think it is probable that you will be able to accomplish that?—Yes.

440. Do you anticipate any difficulty in acquiring the necessary land for that purpose?—I do not.

441. Have you formed any idea of the area of land which you would require?—No.

442. In the event of your having several outfalls wide apart you would require several areas?—Yes.

443. Is there any possibility of combining all the outlets into one?—My arrangement provides for that.

444. It would be a mere question of cost?—Just so, and with one exception all would run into one.

445. (*Mr. Harrison.*) As regards that exception, do you take it on to land at a higher level and at less expense?—We take it at a higher level but at a greater cost.

446. Have you chosen the outfall at Sandford solely to get the best fall, or does it give you the best chance of utilizing the sewage, or is it both?—It is both, but specially with reference to the best fall.

447. What volume of sewage do you anticipate you will have to deal with?—We have a great quantity of water to deal with from our being surrounded by the streams; one stream takes a great quantity of the tail water of the Castle mill, and I was proposing to avoid that tail water and only to use it occasionally for flushing purposes.

448. Are your sewers at all likely to drain water out of the subsoil?—I should say not.

449. Must you not be very careful to prevent the sewage draining out of them?—I think so. I think that it will require special care that the sewers shall be made watertight, both in respect of the sewage and of the water outside.

450. (*Chairman.*) As surveyor to the Board of Health have you anything to do with cleansing out any of the tributaries or streams surrounding Oxford?—Yes. We clean out the rivers where they are immediately connected with the outfalls of the sewers, and we have done so for several years annually.

451. Do you do so as a matter of convenience or of compulsion?—Rather as a matter of convenience to the people living near the outfalls.

452. Is there any authority which could compel you to do this cleansing operation?—Not that I am aware of.

453. (*Mr. Harrison.*) I suppose you do it to prevent a nuisance which would subject you to an indictment?—I think that if we did not cleanse we should be so liable, but we have never let the river get into that state.

454. Are you aware that the city authorities claim the right of dredging the river adjoining the city?—We have always dredged the river for our ballast.

455. (*Chairman.*) What parts?—We dredge where we please; we have never been interfered with in any way. It was always understood that under the old Oxford Paving Acts the Oxford Paving Commisssoners had right to dredge anywhere within three miles above or below the city.

456. No person controls you to see you do not make deep holes or take the ballast irregularly, you do as you like?—I have been sometimes called to account by the city for making a deep hole, and have been requested not to do so, but this was principally because of the punting.

457. (*Mr. Harrison.*) Are there not hills which it would be desirable to remove?—Yes, and when my attention has been called to one of those hills I have always directed the men to take the ballast from that spot. I have repeatedly done this.

458. Have the authorities of the River Commissioners ever pointed out those hills?—Never.

459. (*Chairman.*) What has your dredging cost you per cube yard?—9*d*.

460. Delivered on your wharf?—Yes.

461. Do the parties performing the work find everything?—Yes.

462. Do they do it for any persons other than the city authorities?—No.

463. Could you or would you restrain them if they did?—I think that the sheriff's sergeant would.

464. Do other parties dredge the river besides the men whom you employ?—I think not within the three mile area.

465. (*Mr. Harrison.*) I suppose that there is a quantity of silt of different kinds and gravel brought down the river?—No doubt.

466. Do the millers in the neighbourhood of Oxford take any measures to improve their streams?—Not that I am aware of.

467. Do the Navigation Commissioners?—Not that I am aware of. I have never seen operations of that kind going on.

468. (*Chairman.*) Do you know whether, when you have dredged the Thames and have removed ballast, the river replaces the space with ballast or with silt?—I know that it does not in all cases. I know that there are now many streams where the dredging can be very clearly traced.

469. If you take a large quantity of ballast from any part of the river, can you return after an interval and renew the dredging operations there with any advantage?—I know that I cannot. What we dredge is a very hard crusty bottom and requires considerable labour to get up. The ballast which we get is clean.

470. (*Mr. Harrison.*) But what the river now brings and deposits is a muddy deposit.—Yes, and I never find any of our ballasting holes filled up with mud.

471. (*Chairman.*) For how long do you suppose that this dredging has gone on?—I have been surveyor to the commissioners for twelve years, and it has been going on for that time. I know nothing of what took place before.

472. Have you any more difficulty now in obtaining ballast than when you commenced operations?—No.

473. It costs no more?—No more.

474. What cubic quantity do you think you use in the twelve months?—We use about as much as comes to 100*l*. at 9*d*. a yard.

475. What do you use it for?—For road paving and for gravel footpaths.

476. (*Professor Way.*) You have sent your plans for the drainage of Oxford to Mr. Bazalgette for his consideration and approval?—They are going to-day.

477. Have you pointedly called his attention to the question of the use of sewage on land?—Yes.

478. Have you pointed out the land?—Yes, he has walked over every inch of it with me.

479. Then it forms an integral part of the scheme?—Yes.

480. (*Chairman.*) Have you yourself seen any of the places where sewage is being utilized?—Yes.

481. Where have you inspected it?—I have been to Banbury.

482. How is it used at Banbury?—I am hardly prepared to say, it is 10 years since I was there. I think that it is deodorized there before it is sent into the river.

483. Where else have you seen it?—At Leicester, where it is deodorized, and at Carlisle.

484. How long ago?—Within the last month; I have seen it also at Watford, and I think that I saw it deodorized at Exeter.

485. Have you seen Lord Essex's place?—Yes; I have not been to Croydon.

486. Have you been to Edinburgh?—I went to Edinburgh, but I had not an opportunity of seeing the effect of sewage upon the land.

487. Have you been to Worthing?—Not to Worthing.

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488. Have you formed any idea as to the area of land which you will require for Oxford ?—No, but I am quite sure that in or near Oxford we have considerably more land than we shall require for the utilization of sewage.

489. Do you think that you can get the sewage upon the land by gravity, or do you anticipate pumping ?—I am sure that we cannot get it on the land by gravitation, but shall have to pump.

490. To what elevation must you pump ?—I think we could get plenty of land at an elevation of five or six feet. I refer to grass land. Mr. Bazalgette was quite of that opinion, in fact he said that he never saw a district more favourable for the utilization of the sewage than Oxford.

The witness withdrew.

Charles Neate, Esq., M.P., examined.

C. Neate, Esq., M.P.

491. (*Chairman.*) You are member for the city of Oxford ?—I am.

492. You sat upon the Select Committee of the House of Commons which took evidence upon the Thames river during last session ?—Yes.

493. Have you yourself formed any definite opinion as to the future management of the Thames ?—The idea which I had at the time when that committee sat was that the present body of Commissioners should be dissolved, and that there should be substituted in their place an elective body to which the counties and boroughs within the length of the Thames should contribute. I would prefer not a very numerous body, say a body of 30 or 40. However, I do not see that you can attain any effective management of the Thames without having some rating power put upon the riparian proprietors, or upon the counties, or upon the boroughs, or upon all.

494. Should there be an extension of the Conservators, or would you have the Conservators as they are and establish an independent body above the line of the Conservancy ?—I would have one management of the fresh-water Thames and another for the tidal Thames.

495. You would leave the Conservators as they are ?—So far from that I think it would be better to restrict the Conservators within their ancient limits. The original principle of the Thames Commission was to separate the fresh-water river from the tidal river. The ancient limit of the Conservancy originally was Teddington, but it having been found that the Corporation of London had some old rights up to Staines which interfered with the new rights given to the Thames Commissioners, it was thought best, in order to prevent any collision, to give a limited supervision of the Thames as far as Staines to the conservators. My idea is that the chief difficulty is the money. When I took an active part in suggesting the appointment of the Select Committee I was in hopes that the Government would give the money, but they did not seem to show any disposition to do so, and there has since been a suggestion that the Thames Conservancy should take the management. I myself entertain great objections to that, and I think that when the plan is more fully set forth the local interests will be very unwilling to give themselves up to the management of a metropolitan board. We cannot find that any great local feeling has as yet been excited upon the subject. The great feeling, as far as I can see, of the landed proprietors on the river side is to avoid a tax, and I believe that the boroughs participate in that feeling. I should add that in my opinion no effectual system of Thames management can be established without dealing with the mills. The Dean of Christchurch said that, according to Mr. Crossley's plan, an effective system of management could be established over the river without disturbing the rights or gains of the millers, but the millers very probably would not be of the same opinion. The best thing is to transfer the mills into the hands of whatever new body should be constituted to manage the Thames. This body must have compulsory powers to acquire the absolute control, and must of course pay some compensation. That compensation, however, need not be measured by the full value of the mills. The sort of bargain which I should suggest would be this: to say to the miller, "We buy your mill, but we are "very willing to give you a lease of 21 years upon "terms giving us the control over the water, which we "do not now have." Of course the mill would be less valuable under those circumstances than it is now, but still it would have a considerable value. I take it that the water power of the Thames, if properly managed, would be of considerable value, but it would be of less value than now; and all that you would have to pay to the millers is the value of that difference.

496. If any idea was formed of getting money from Government, upon what security should Government grant the money ?—Upon the security of the profits of the Thames.

497. To new commissioners existing with new powers ?—Yes, and those commissioners should mortgage the income of the Thames to the Government in the same way as they have now mortgaged it to the bondholders; but this could not be done unless the present bondholders were willing to postpone their security.

498. But the income of the navigation is a minus quantity ?—We had very strong evidence before the committee that the income is capable of being very greatly increased, that the railways are overworked with the traffic, and that there is a reaction, and that at any rate it is very desirable in the public interest to have a little competition with the railways.

499. To what extent do you agree with the conclusions in this report of the committee of which you were a member ?—I do not at all concur in handing the river over to the Thames Conservancy. At the same time, if the Thames Conservancy are willing to pay the debt and buy up the mills, I think the project is likely to be acceded to.

500. (*Professor Way.*) Do you think that the landed proprietors would prefer a Government board of superintendence to that of the Conservators, supposing that Government thought right to grant a sum of money in the shape of a gift ?—It might be thought an injustice for Government to lend money for the river Thames unless it did the same for other rivers also. But if Government did grant a loan, then I think that there might be some Government inspection, or an appeal might be allowed to the Board of Trade if the exercise of the jurisdiction by the new commission was not satisfactory; but in any case Government control should be indirect only.

501. (*Mr. Harrison.*) Might you not have a governing body composed of persons directly interested in the maintenance of the navigation and the condition of the river ?—Yes.

502. Or if the commission did not have such a direct interest in the river, then it would appear desirable to have some Government control to see that they carried out the objects of their appointment ?—The only commission which I have suggested is a commission of persons interested. When once the river was put in a good condition there would not be a great deal to do. The board would work like other unpaid offices which are not very badly discharged, such as the magistracy, or the local government of a town.

503. (*Chairman.*) But in the latter case the real work is done by paid officials ?—Yes, and such a body as I have contemplated would require a well-paid engineer and surveyor and clerk.

504. Do you consider that the works are in such a state that some authority should step in to prevent a catastrophe ?—I think that it is very desirable that somebody should step in to restore the works upon the Thames. Supposing that the Thames Commissioners gave up repairing a pound lock, the miller might not care to repair it himself, he would put a block across. Then the question would arise whether the miller would not be bound to keep up his weir in such a condition that barges might go by.

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C. Neate, Esq., M.P.

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505. (*Mr. Harrison.*) Your observation shows that there is a responsibility upon the old lock owners?—That would be the question. The navigation by single locks existed before the new system of pound locks, which dates only from about 1780. If the Thames Commissioners became unable to maintain their present locks, the old liability would I suppose revert upon the lock owners. I do not suppose that millers care much about the traffic; they care more about the use of water for their mills and fisheries. At some places, however, it is otherwise, and the miller would be willing to do what was necessary to maintain the navigation.

506. (*Chairman.*) In the report of the Select Committee it is stated that the lock owners render no service for the tolls taken by them?—They render no service at all.

507. Are they not the persons who maintain the weirs?—They maintain some of the weirs, but they do it for their mill purposes.

508. If there had been no mills, that part of the navigation must have fallen upon the Navigation Commissioners?—Yes.

509. The principal contribution of the Commissioners to the navigation is to provide pound locks for boats to pass from one pond to the other?—Yes.

510. But the pond of water between the locks is maintained by the erections of the old lock owners?—No doubt; but that is maintained at very little expense, it is only a mound of stones. The expense of keeping up weirs, as compared with the expense of keeping up locks, is, I believe, very trifling.

511. It was a mistake, then, to say that the lock owners did no service; they do service, they maintain the ponds?—Yes.

512. In case of the Commissioners failing, would not this be a sufficient justification for the lock owners continuing to claim their old dues?—If they kept their weirs in such a state as to permit of navigation, of course they would earn their dues, but the question is whether they would keep them in that state and could be forced to do so.

513. You heard what Mr. Harcourt said yesterday as to riparian proprietors being unwilling to contribute anything towards the improvement of the river?—I should have liked to have asked Mr. Harcourt whether, instead of putting up banks to prevent floods, it would not answer the purpose as well to draw off the water from one level of the river to a lower one.

(*Dr. Adams.*) The communication which I had with Mr. Bryan Wood on that subject convinced me that the plan which you now propose is not feasible. Not being an engineer I thought as you do, that it was possible so to adjust the bed of the river that we could do without banks; but he assured me that it is necessary for the purpose of efficient drainage that there should be subsidiary channels irrespective of the river, and also embankments. An embankment must be thrown up on the one side and a channel made on the other side.

(*Mr. Harrison.*) That channel would merely be for taking off any drainage water, but what Mr. Neate proposed was a means to take off flood water.

(*Mr. Neate.*) I meant any water.

(*Dr. Adams.*) The channel at the back of a raised embankment takes off the water, which otherwise would percolate and find its way into the river.

514. How would you prevent such a board as you suggest for the management of the Thames being a very large one?—The counties which are interested in the Thames are Berkshire, Buckinghamshire, and Oxfordshire, and each of those counties might elect three managers, and you might give one to Gloucestershire, but Gloucestershire has a very trifling interest. The towns which have a great interest in the Thames are not very numerous. Oxford is the one which has the greatest interest, undoubtedly; besides Oxford are Abingdon, Wallingford, Reading, Windsor, and Marlow. You would not get a board of above 30.

515. Where should that board meet?—At different places at different times of the year.

516. Is it to be an unpaid or a paid board?—An unpaid board, but with paid officers, and with the expenses paid. I think that people are unwilling to pay a pound or two to go to a meeting.

517. Do you not think that there would be practical difficulty in getting together a board of gentlemen who could come or not, as they thought proper, if they had three or four miles to go to attend the meeting?—I think that it would be easy enough to get a sufficient number of men, you would not require the attendance of all at the same time. I think that it would be a very interesting subject to most of them, and that they would be willing to do this as they do other things.

518. (*Mr. Harrison.*) Even though they had not a direct interest in the question?—Yes, without having a direct personal interest. They would be selected from the county gentlemen. For instance, Mr. Harcourt would naturally be a member of such board.

519. He has a personal interest?—Yes.

520. (*Chairman.*) What authority in the county should appoint the members?—My idea was that they would be appointed by the Court of Quarter Sessions.

521. Then the Court of Quarter Sessions might appoint three members for Oxfordshire not one of whom might have any interest in the river?—The town council of Oxford would appoint its own representatives, and the University also. The towns have rather a greater interest in the Thames because they depend so much upon the river for their supply of water, and up to the present time they have depended upon it for carrying off their sewage.

522. There would be a great many more than 30 persons?—Three members from four counties would make 12.

523. (*Professor Way.*) And there are six or seven towns?—Yes.

524. (*Chairman.*) There are far more than six or seven towns interested?—The smaller towns would be represented by their county; Henley of course would be represented. If you gave two members to one town you might give one to another, and I think that you would get a very manageable board; and I believe that if the Thames were once put into a good condition you would get a board which would keep it so.

525. How would you propose to buy up the present right of the mills?—One idea which has been suggested to me is, that terms might be made with the millers not to use their mills beyond nine months in the year. The difficulty is that there is a time when there is not water enough both for mills and for the navigation. It might be advisable to have power at such times to stop a mill upon giving compensation.

526. It would involve re-leasing the mills?—Yes.

527. (*Professor Way.*) If a paper maker or a miller could not supply his customers for three months in the year, would he not lose his customers?—I think that the water interest of the Thames, even upon those conditions, would be useful; of course it would be worth very much less than it is now.

528. Do you say that there would be no hardship in the money being raised by a rate?—No; my idea of a rate is this, I would put so much upon the boroughs and so much upon the counties.

529. Would there not be a difficulty with regard to levying the rate?—I do not know that there would be, it would be added to the county rate.

529*a*. Then you would charge the whole county?—Yes, the magistrates might apportion the rate if they chose, perhaps they would find it not worth while; double the amount might be charged upon residents on the river or within a certain distance from it. A very trifling rate would be enough when the work was once done, and there would be a proper rate upon the boroughs.

The witness withdrew.

Adjourned to to-morrow at 10 o'clock.

Oxford, Thursday, 2nd November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

THOMAS RANDALL, Esq., examined.

OXFORD.

T. Randall, Esq.

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530. (*Chairman.*) You are an alderman of the city of Oxford?—Yes.

531. And intimately acquainted with the present condition of Oxford as regards its rivers and streams?—Yes. I am also a Thames Commissioner.

532. By virtue of what?—Of property.

533. How long have you acted as a Thames Commissioner?—I think for 12 or 14 years at least.

534. Do the Thames Commissioners meet at any stated intervals?—Yes; they have, I think, quarterly meetings.

535. Have you personally attended many of those meetings?—Almost all, since I was appointed.

536. What number of Commissioners upon the average do you think have attended?—About ten.

537. Out of a body of from 600 to 700?—Yes.

538. What are the general subjects of discussion?—The subject has been the falling off of our funds, our inability to grapple with our necessities as regarded larger works, and the application of such funds as reached us to partial repairs.

539. Do you at those meetings receive written or verbal reports, or both, from your engineer and other officers?—Our engineer is always present, and in addition to that he furnishes us with a written report.

540. What becomes of those written reports?—I believe that they are in the hands of the clerk, Mr. Graham.

541. Do you think that we could have access to them if we thought proper to require it?—I have little doubt of it. I think that the Thames Commissioners have nothing to withhold.

542. Have the Commissioners, during the period you have attended these meetings, had brought to their notice the ruinous condition of the navigation, and the consequent danger?—We have.

543. Has that been a matter of frequent occurrence?—Recently it has taken place at almost every meeting.

544. What has been the reply of the Commissioners?—The reply of the Commissioners has been to apply all possible means to such works as might protect the public from injury, and the navigation; by the public I mean the owners of lands abutting upon the Thames, the riparian proprietors.

545. In the event of a lock or a weir absolutely blowing up and going to ruin, have you the means at command of restoring it?—We have not, for anything like large expenses; the funds would be sufficient for temporary construction.

546. Have you yourself any interest in the river navigation in any way by trade?—None whatever.

547. Who are the parties specially interested in the maintenance of the navigation, according to your idea?—The Canal Company especially, and all dealers in coal from Oxford downward.

548. And in agricultural produce?—And in agricultural produce also.

549. Before the railways were constructed there was a considerable amount of traffic on the canals, and on the Thames navigation in connexion with the canals?—There was.

550. That has been removed to a great extent since the opening of the railways?—It has.

551. Do you think that that has been in consequence of the ruinous condition of the river, or of the greater facilities of the railway, or of both?—Principally in consequence of the railway, but recently also of the state of the navigation.

552. Have you formed any idea as to whether a paying trade might be carried on, if a judicious renewal of the navigation was undertaken?—My impression is that it might.

553. On what portions of the Thames, above Oxford or below?—From Oxford downwards.

554. I suppose that there are navigation works above?—There are, but they are not maintained in a useful condition.

555. Do you think that the restoration of the navigation works above Oxford would be a paying outlay?—I do not; but I should like to give that answer with some qualification. There is some traffic from Oxford to Ensham, but that goes round by the canal, as you are aware. Anything coming down stream from Ensham would turn into the canal, at what is called the Duke's lock, and then would come out of the canal again in Oxford, near the North-western Station, and thus get again into the main river. The part of the river above Oxford, by Port Meadow and King's weir, is now in disuse.

556. Would you or not, as a Commissioner, recommend the restoration of the navigation from Folly Bridge to Lechlade?—Decidedly not.

557. As a Commissioner, have you had the fact brought to your notice that barges at any time have been prevented from using the river from floods?—Only in extreme floods.

558. That is never the case with the canal?—Never.

559. The canal is continuously used under all conditions and circumstances?—I believe so, except in frost; and the river is subject to the same contingency.

560. Have the rights of fishing come under your consideration at your Commissioners' meetings?—Not to any extent. Occasionally persons having rights of fishery have, I think, been complained of as doing some damage to the navigation by the way in which they use the water, but I cannot from memory advert so any special case.

156. Have you had any complaints of riparian proprietors misusing the river in any way opposite their frontages by improperly planting?—No, I cannot advert to any such complaints. I myself brought some circumstances before our board connected with the blocking up of the river.

562. By planting?—Not by planting, but I should say self-planting. I do not believe that the growth to which I particularly advert near Nuneham was planted purposely. Portions of osier came floating down there; the character of it was that it was self-planted.

563. It was an obstruction?—Yes.

564. Do you recollect having had any complaints of riparian proprietors abusing the river by tipping in waste material, such as old foundation rubble or waste soil, or anything of that description?—There may have been such a case, but I do not remember any.

565. From Folly Bridge downwards you think that a paying income might be obtained from the restoration of the navigation?—It would depend a good deal upon what would be the cost of putting the works into a thorough state of repair.

566. And the dead debt which is now upon your shoulders?—Yes.

567. If the navigation is to be restored you would be disposed to begin by wiping off all existing responsibilities?—Yes.

568. And to supersede the existing Commissioners?—I think the body wants reconstruction. The Commissioners attempt to do their duty, but under the most difficult circumstances.

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T.Randall,Esq.

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569. Do you see your way to making a working body out of the existing commission, constituted as it is ?—Yes.

570. When, in your own experience, the utmost number that you get is 10 or 12 out of 600 or 700 ?—I think that a meeting of 10 or 12 often does business better than a meeting of 600 or 700.

571. That I agree with; but supposing that you had 10 or 12 meeting from week to week with an attention to their business, mastering the subject, and initiating measures for the benefit of the navigation—could not they be swamped by any crotchety person drumming up the outside Commissioners who had never attended at all, and who did not care about the subjects ?—Yes, they could.

572. Do you think that if valuable contracts had to be let, or if appointments had to be made, the vast body of Commissioners would allow the 10 or 12 who were the constant workers to exercise this patronage without interference ?—My mind is directed to the business men whom I am in the habit of meeting at the board when I go there, and I see the position which they hold and the intelligence which they display. I regard the commission as an efficient working body, but I think with you that the good efforts of these few might be entirely thwarted through the constitution of the board, by the mere force of numbers.

573. What is your opinion of this proposition, that the present Commissioners should only have the power of voting for a working committee, and that that working committee should hold its authority altogether independent of the general body for a given number of years ?—Such a constitution would be far preferable to the present one. I think that that elective body would put together a committee capable of rightly administering and disposed rightly to administer any funds for the Thames.

574. Do the gentlemen who attend do so simply as being business men and from their love of business, or have they any special reason or interest in attending ?—I never had an idea that the gentlemen whom I have generally met have been influenced by any feeling of gain, but I remember some few years back, when some of the bonds were bought up at a very cheap rate, that some parties came in, and on that occasion I think that the efforts of those who attended were with an idea of creating a dividend ; but those are not the gentlemen that I am generally in the habit of working with there.

575. Has there been such a thing as the appointment of any paid officer since you became a commissioner ?—Yes, a surveyor.

576. Was that appointment carried by a small meeting or by a large meeting ?—I should say there were present certainly not more than 150. I should think that 100 would be quite the number, but you can ascertain that by reference.

577. Still it was a very large meeting, and such a meeting as you had not seen before ?—It was such a meeting as I had not seen before.

578. Have you reason to think that there would be a similarly large meeting on any other occasion when a place had to be disposed of ?—I fear that such would be the case. In the instance I am now referring to, the gentleman who was appointed surveyor was dwelling in the city where the election was held, and I think that all the members who were close in the neighbourhood voted, but not a great many from any great distance came to vote.

579. Is there any payment for travelling expenses to Commissioners when they attend at a distance ?—Yes, for attending at the committee meeting, but not at the general meeting of the whole body.

580. What is it ?—Sixpence a mile, I think.

581. Is that there and back, or simply 6*d.* a mile one way ?—I think that it is there and back, but I am not quite sure.

582. At these meetings have you observed that the 10 or 12 members are generally or constantly the same individuals ?—Yes; I should mention further that the committee meet immediately before the general meetings, and in the same town. The committee meeting over, the committee men go across to the general meeting in the Town Hall, and there I have very seldom seen any large accession of our members.

583. The general meeting and the committee meeting have been composed of the same persons ?—There are very few additions. I can remember one or two occasions when there have been rather large meetings, perhaps 30 or 40.

584. In your opinion what sum would enable you to purchase the 88,000*l.* debt to bondholders. If many of the creditors have offered to take 2*s.* in the pound for their debt, and have not obtained it, it is quite clear that the bonds have not been considered worth that money ?—I think that 8,000*l.* or 10,000*l.* would buy up the bonds.

585. Do you remember having at any of your meetings discussed the question of a reconstitution of the Thames Commissioners, for the purposes required upon the river ?—I do not remember that subject ever having been discussed.

586. It is hardly fair to ask you whether you have discussed the question of coming to nothing ?—We have.

587. You have contemplated extinction ?—We have decidedly. We took an opinion some months since as to our personal liability for any orders which were given at any of those meetings that we attended, and learning that our attending and voting on orders for outlay involved our own personal responsibility, we avoided it.

858. Such liability is in itself a great bar to efficient management ?—Doubtless.

589. Did the opinion also extend to this, that although no order had been given the cost of repair might fall upon the Commissioners ?—No.

590. If, in consequence of the ruinous condition of the works, a flood washed down mills or bridges, you do not know who would be responsible, whether the committee or the whole body of Commissioners, or whether any person ?—I do not.

591. Or whose duty it would be to make restitution, you, the Commissioners, having no funds ?—I do not know. We put that case before the Board of Trade, I think—that is to say, the possibility of such a circumstance, but I do not think that Mr. Milner Gibson defined upon whom the responsibility would rest.

592. I see that the ninth resolution in the report of the select committee of the House of Commons is, " That a bill be introduced by the Board of Trade to " give effect to the above recommendations;" have your committee taken into their consideration the advisability of preparing clauses for Mr. Milner Gibson ?—Not in my presence. I was out of England from March till July, and several meetings took place in my absence, so that I am not able to answer that question.

593. It has not come to your personal knowledge ?—It has not.

594. Do you not think that, as Commissioners, you should be consulted as to the clauses to be embodied in any bill for the future government of the Thames ?—Yes, I think that the knowledge possessed by the committee would be useful in the embodiment of such clauses.

595. Have you yourself formed any opinion as to the advisability or otherwise of the commission having absolute control over the working of weirs, locks, mills, and other things which interfere with the flow of the water ?—I think that it is absolutely indispensable that they should have control over the whole.

596. And you think that it should not be in the hands of millers, owners of navigations, or fisheries, or any other persons ?—No.

597. Have you any idea whether there would be a strong opposition on behalf of the existing Commissioners to parting with their executive power, if they were allowed to elect an executive committee to remain in office for several years ?—I have not had opportunities of gathering from intercourse with the

general body of the Commissioners what their opinion is; but from their usual absence at our meetings I fancy that there would be no opposition; I do not think that they care about their powers.

598. Would you individually, although you have regularly attended their meetings, be willing to lay down any power which you now possess, retaining your elective power?—Most ready.

599. Supposing that you stood for election, would you be willing to act as an elected representative?—Yes, as a matter of duty I should do so.

600. (*Professor Way.*) It is proposed by the recommendation of the committee of the House of Commons, that the conduct of the Upper Thames should be handed over to the Conservancy Board who now manage the lower part of the Thames. Do you think that that would meet with opposition on the part of the present Commissioners?—I think that it is distasteful to the present acting Commissioners. I only speak of those whom I am in the habit of meeting.

601. In spite of their responsibilities and the existing difficulties of their position, they would still object to the charge of the river being handed over to the Thames Conservancy Board?—Yes.

602. (*Chairman.*) Have you paid any attention to the projected schemes of improved embanking and draining any portion of the Upper Thames?—My attention was some time since specially directed from feelings of duty, and also from my position as a Thames Commissioner, to the relief of Oxford from flood water,—and co-operating with our own engineer, Mr. Treacher, I devoted a great deal of attention to it. He submitted a plan conjointly with myself to some gentlemen of influence in connexion with the University. Close to the lock at Sandford he suggested placing a long lasher, if I may so call it, 50 yards long, the lip of which should be at high-water mark; and in addition to this he proposed that there should be moveable tackle, so as to afford a still further relief of 18 inches below that lip. The plan was so far gone into that Mr. Norris, the owner of the mill, was consulted as to his allowing the use of a site for it, and he complied with the request on certain conditions, which were these—that the University or some other body should undertake that whatever works were there constructed should be maintained free of cost to him, and that out of consideration that such a measure would bring the tail water on his mill more readily, and reduce the fall (as he supposed), the outlet for water in the narrower channel of the Thames, between Sandford and Nuneham, should also be relieved. At Iffley Mr. Treacher proposed also a similar construction at high-water level, so that the flood should be anticipated, and the water relieved directly it came to that point.

603. (*Mr. Harrison.*) They were works which would prevent the miller from tampering with the high-water mark?—Decidedly, he could never get the water above high-water mark excepting in extreme floods.

604. Is there a weir of the description which Mr. Treacher proposed near Abingdon?—No; but there is an illustration of the principle at Abingdon, where a long piece of the towing-path is paved, and acts as a lasher in relief of floods.

605. (*Chairman.*) It acts as a bywash?—Yes. I saw a very extraordinary instance of the efficacy of it in company with Mr. Neate. We went down to Sandford to see the flood water, and at the tail of Sandford mill the water was 3 feet above high-water mark. We drove on to Abingdon, and at the point which I mentioned the water was only 7 inches above high-water mark, there being no artificial impediment to the flow of the water on that reach, although there are natural impediments which have great influence and cause great obstruction to the water between Sandford and Nuneham.

606. Since you became a Commissioner have any mills been removed, or enlarged and added to?—I remember when Sandford mill was a corn mill and of not half its present proportions.

607. Have any paper mills been extended or enlarged since you have been a Commissioner?—Not since I have been a Commissioner, to any extent. I think that the operations of the mill of Mr. Towle have been extended, but I do not remember any enlargement of the mills. The deposits for the material which he uses I think may obstruct to some slight degree the passage of the water down the back stream.

608. Have there been any complaints as to the fouling of the river by any of the mills?—I have witnessed the fouling, but I have not known formal complaints made before the committee of the commissioners when I have been present.

609. What effects have you yourself witnessed, and where?—At Sandford mill, which is a paper mill, I witnessed the effect some six weeks or two months back; I was coming up the river, and when we got near to Sandford mill it looked as if the place was all covered with snow. We knew that it was water, and we found that it was a very deep froth, and the water itself we found of a very dark colour. It appeared as if an immense quantity of coloured chemical matter had been discharged.

610. (*Mr. Harrison.*) In extreme floods at Sandford have you observed whether there is much difference in the level of the water immediately above and immediately below the Sandford lock and mill?—Yes; I have always considered that the great block to the flood water of the Thames is at Sandford. When you get below Sandford it appears to be at once relieved, but I attribute that to a great extent to the operations at Abingdon, which are very effectual for the relief of flood water.

611. At Iffley is there much difference in flood time in the level of the water above and below the lock?—No.

612. At the locks immediately in Oxford does the water go down without any distinct fall?—There is very little fall there.

613. At the locks above—at Osney lock how is it?—The valley is wide there, and the water passes it very well; very little flood comes on the eastern side of that lock.

614. So that from your observation in times of flood, going from above Oxford downwards, you have not observed any distinct and rapid fall of the water until you get down to Sandford, and then there is a very distinct and rapid fall at the weir?—Yes.

615. (*Professor Way.*) Have the Commissioners any power in case of nuisances in the river?—I am not aware of any. I suppose that it is in the Act, but I cannot advert to the provision.

616. Then it is possible that it may exist without your being aware of it?—Yes.

617. (*Chairman.*) Have you anything further to add as to the river proper?—Yes. With respect to the ascertained state of things at Abingdon, I considered that the river between Nuneham and Sandford was very seriously blocked up, and I remember the possibility of deepening the channel being considered by our late surveyor. The rock crops up at some part of the river near Radley Common, and blasting alone could remedy the evil—that is about half a mile below Sandford mill. At that part of the river the channel itself would be naturally very wide, but islands are formed there with rushes, so as almost to obstruct the passage of the water. Below at Nuneham a little island has grown up just at the fork by the original island, and I think these various obstructions at that point accounted in some degree for the extraordinary difference of the levels on the occasion which I spoke of at Abingdon and at Sandford. Then, as to Sandford, the water mark there, I think, has been unduly treated. The mark I understand is below the words "high water;" but I believe that the miller at Sandford treats it as being above. I recollect a lasher in Kennington Reach as being a different height from what it was originally. I have always regarded this tampering with the mark as co-operating to produce the mischief which we have experienced around Oxford. Mr. Treacher considered that with great benefit to the locality high-water mark might be lowered five or six inches, but not more. Some parties named a much greater lowering of the

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level, but their wishes could not be complied with, because the boats could not then have passed over the sill of Iffley lock. I wish also to speak as to the quick access of water to Oxford and its neighbourhood since the agricultural drainage system has been in operation, and also since the embankment was made at Bampton. Above Chimney there was a very large boggy place called Aston Mead. Twenty years ago, when I went up there fishing, it was quite a difficulty to make one's course across, but now that meadow is entirely relieved of water by a cutting through it. By this great alteration the waters are brought down on Oxford more rapidly, and the summer supply of water has been seriously affected; and all the many large operations of the same kind tend to produce the same result. We have the same thing at Otmoor on the river Ray, a tributary to the Cherwell.

618. Are you merely expressing an opinion, or are you stating a fact known to yourself?—A fact known to myself and confirmed by the observation of others. One of my informants was Mr. Taylor, at Hall's brewery. The firm occupies lands on the lower level at the back of the brewery, and he told me that it used to take some two or three days for the water gradually to rise to cover the meadows near his house, but that now he may see the green when he goes to bed at night, and in the morning find it covered with water.

619. Has there been to your knowledge any establishment of factories or works of any description other than mills requiring water upon the Thames or upon its tributaries?—No other than paper and flour mills, that I am aware, except that at Egham are projected works for the application of gas tar and similar materials.

620. Have you had such a thing as a new weir at any point of the river within your knowledge?—None that I remember.

621. Have you any knowledge of the extent of the main sewerage at present in Oxford?—Yes.

622. Have you knowledge of any nuisance from sewers emptying themselves into the streams?—Yes, I have a knowledge of a nuisance in the Cherwell especially, and also close to my own house, at the bottom of the Trill mill stream.

623. I believe that a scheme for re-sewering the city has been laid before the committee?—Yes.

624. Has the question been brought before you as to the pouring of the contents into the river or the utilization upon land?—I think that the intention has been to adopt Sir William Cubitt's plan, and to have large tanks for deposit of soil, and to pass the deodorized water on into the Thames. Sir William Cubitt fixed the point for the tanks where those operations could be carried out. The mode of doing it is not in Sir William Cubitt's plan.

625. (*Professor Way.*) What is the date of Sir William Cubitt's report?—I think about eight years back.

626. Is it the case that public opinion has undergone a considerable alteration since the time of Sir William Cubitt's report, as to the practicability of the use of sewage on land?—It has been an agitated question for some years, and especially since the time that I am speaking of.

627. (*Mr. Harrison.*) Mr. Galpin informed us that he thought there would be no difficulty in getting land for irrigation purposes?—None whatever.

628. Are you aware of any instance of the waterway being enlarged or increased?—The surveyor instructs me that at Iffley mill there is an increase in the waterway of about seven feet.

629. (*Chairman.*) Are you aware that some new work at Sandford mill, at the small lasher, blocks up the stream?—No, I cannot say that it is different from what it originally was in that respect, except that I imagine that the top level of it is higher than it was some years ago. I have an impression that something of that sort took place in Mr. Swann's time. I may be right or wrong.

630. (*Mr. Towle, through the Chairman.*) When were you last appointed a committee man?—On Saturday last.

631. How many were there to appoint you?—About eight or 10, not more.

632. Were there more than four?—Yes.

633. (*Chairman.*) What number were appointed on that day?—Three district Commissioners for the upper district.

634. How many Commissioners were present?—10 or 12.

635. And they appointed three out of that number?—The town clerk and myself were the only ones present, the other committee man who was appointed was not present.

636. How did the committee present know that the parties wished to be appointed or would act?—I was asked if I would act if re-elected, and I consented, and the town clerk in the same way. I do not know whether Mr. Dore's permission was asked; I do not know that either of us was solicitous to go back. I myself was not so, but I considered it a duty imposed upon me. I had a notice to attend and I attended.

The witness withdrew.

Mr. J. H. Stacy.

Mr. John Henry Stacy examined.

637. (*Chairman.*) You are, I believe, manager of the University mill at Wolvercot?—Yes.

638. How long have you had the management of that mill?—10 years.

639. What is the horse-power of the mill?—It depends upon the time of year.

640. Take the least and the greatest?—Not more than six horse in summer, or 24 horse in winter; there is a great deal of waste in winter.

641. Do you know what is your head at those two periods?—In summer we have a fall of about four feet three inches, and in winter a fall of about three feet.

642. What form of wheel do you use?—We use a breast wheel, taking the water a little below the centre of the wheel.

643. How do you account for your obtaining a greater fall with a less head?—In summer the tail water is 12 to 18 inches lower than in winter, while the head is kept as nearly as possible to one uniform height throughout the year.

644. Then it is the velocity of the incoming water upon the wheel which gives you the extra power when you have a less fall?—Exactly.

645. (*Mr. Harrison.*) I suppose that the power in winter depends in some measure upon the number of hours that you can work?—We can always work in winter time, except in the highest floods.

646. Can you always work in summer time?—We can get six horse-power all the time in summer; we are not obliged to shut at any time.

647. Have you more than one wheel?—We have three wheels.

648. Do you work all three wheels in summer?—No, we can only work one in summer.

649. Then you get your extra power in winter by bringing a greater number of wheels into play?—Exactly, in order to take the excess of water.

650. (*Chairman.*) Are the wheels all of equal power?—Two are 10 feet wide and one is 8 feet wide.

651. For what purpose is the mill used?—For making paper.

652. For the University?—Yes.

653. Has the trade of paper making been enlarged or otherwise since you have had the management of the mill?—The trade taken as a whole has very much increased during the last ten years.

654. You are now making more at your mill than formerly?—Yes, we have increased from 6 tons a week to 10 tons; that is in consequence of using steam power.

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655. You use steam power besides your water power?—Yes.

656. What steam power do you use?—Nearly 100 horse.

657. What is your paper made from principally?—Entirely from rags.

658. Taking a pound of rags, do you know what weight of water you consume or require to make that pound of paper, I mean for washing and converting it?—No; I scarcely think I could estimate the quantity.

659. (*Mr. Harrison.*) At the Pennicuick mills of Messrs. Cowan, near Edinburgh, they make about 40 tons of paper per week, and they gave me as a fact, the other day, that they use in the cleaning of that paper and other purposes about 500 gallons per minute for 24 hours daily; that would be about 7,200,000 lbs. of water a day, or 560 lbs. of water used for each ton of paper, that is merely for the cleansing. Does your experience bear out that statement?—A cwt. of raw material would, I think, require 50 gallons of water per minute for three hours, that will come nearly to Messrs. Cowan's number—it will come to 900 lbs. of water for each lb. of material.

660. (*Professor Way.*) That is for washing alone?—Yes.

661. It is 900 lbs. for 1 lb. of material and not of paper?—Yes.

662. I suppose that you make for the general trade as well as for the University?—No.

663. Have you observed since you have had the management of that mill any alteration in the flow of the water coming down to you?—Ten years is rather a short time to form an opinion upon that point, but I think there has been an alteration of 12 hours in the time the flood comes down to us after rain.

664. It comes down quicker by 12 hours?—Yes; from what I have heard from those who were there before me, 48 hours was the average, and I have found it 36 hours.

665. Do floods now rise higher or act in any way more injuriously than floods which you have heard spoken of before your time?—A greater provision should be made for floods because they come down quicker and in a larger volume, and the old waste gates and weirs are scarcely sufficient to take them.

666. Have you any old marks of former periods as to flood level?—Yes; we have marks of flood levels of the winter of 1852-53, and that is considerably higher than any flood which we have had since.

667. Have you anything of the last century?—No.

668. (*Chairman.*) Had these drainage works that we have heard of been executed above your mill previous to 1852-3, or were they executed since?—I think since. The majority of the drainage works have been in the last 12 or 15 years.

669. If the floods of 1852 were much higher than anything which you have experienced since, how do you come to the conclusion that you have greater floods now than you had formerly?—Because several things have tended to reduce floods in our neighbourhood since then. The making of the Great Western Railway, the ditches on each side of the line, and the large cuttings made by the company, have very much improved the delivery of the water in the neighbourhood of Wolvercot.

670. Are you aware of any alteration in weirs, by-washes, or flood-gates, or any other of your permanent works tending to raise or lower the height of the river?—There has not been the least alteration made during the 10 years that I have been there.

671. Supposing that you or the proprietors of the mill wished to raise the weir, could you do so, or would you be restrained by the Commissioners?—Yes; we have reason to believe that if we allowed the water to get above the regulation height they would certainly interfere with us.

672. Does the engineer inspect you at any time or come near you?—Not that I am aware of. I have never seen him.

673. Did you ever see Mr. Treacher?—Frequently.

674. Did he come to look after the works?—He never made any complaint of the way in which the water was kept.

675. Did he come at all to interfere professionally?—No; I must correct myself. Mr. Treacher and some of the Thames Commissioners once made a complaint, I think, that the water was two inches too high. Mr. Randall was one of the commissioners. I should think that it may have been three or four years ago, or perhaps more than that.

676. Had something been done to the weir?—No; the gates were not open at the proper time, that was all. The mere opening or shutting of one gate would alter the level to the extent of two inches.

677. Have you anything to do with King's weir?—Yes, it belongs to the mill.

678. Do you draw King's weir at the times appointed by the Thames Commissioners for passing flashes?—Yes, if required.

679. (*Mr. Harrison.*) By whom are you required?—Boatmen generally come up on flash days and ask to have the weir drawn.

680. (*Chairman.*) Do you keep flashes penned up to work your mill?—The flashes are not penned up at all, they do not reach us till they are wanted by the boatmen, and we are obliged to pass them directly they come—they seldom last above six hours.

681. (*Mr. Harrison.*) It has been stated to us that the millers occasionally, when they know that flashes are coming down over night, draw their water as low as they can, and then shut their gates and prepare for the flash in the morning?—Very likely; but I can safely say that it has never been done at Wolvercot.

682. (*Chairman.*) If you had an option in the matter, would you have the flashes as now worked?—I would rather have the flashes spread over the whole week. A flash now comes down to us in a large body and much more than we can use, and we are obliged to pass it to waste. In summer time, if a flash came down gradually through the week, instead of getting 6-horse power we should get 8.

683. (*Mr. Harrison.*) At Sutton Courtney mills they expect the flash about a certain hour and put more water wheels to work, and so utilize the whole of the flash as to gain extra power for about four or five hours; are you able to do that?—We do that.

684. (*Chairman.*) Is it within your knowledge that the upper part of the river is in any altered condition as regards the growth of rushes, osiers, weeds, and other obstructing materials; is it at all worse or better?—It is worse. It is getting worse every year. The fact of the navigation being almost stopped in the reach above us has naturally caused the growth of weeds, and the river has very much silted up in the channel, which was formerly kept clear for the passage of boats.

685. (*Mr. Harrison.*) Have you, as a miller, ever taken any pains to clean out the channel at your mill?—Frequently.

686. (*Chairman.*) Have you been troubled with the new American weed?—Very much.

687. Have you been put to any expense in cutting your waterways above or below?—Both above and below we are obliged to cut them much more frequently than we did.

688. To what extent do you go?—We generally go about two miles above and one mile below.

689. Have you any idea of the annual cost of that cutting and cleansing?—I should think that in our case it may cost 5*l*.

690. Not more?—Not more.

691. Do you employ your own labourers, or do you pay some persons by agreement?—We employ our own labourers.

692. What becomes of those weeds when you have cut them; do you take them bodily out of the river, or float them to the next mill?—They go to the next mill.

693. You do not trouble yourselves about taking them out of the river?—No.

694. Are they a benefit to the next mill or other-

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wise?—No; when the millers above cut their weeds we of course are very much inconvenienced and have to remove them, because they would not pass through the wheel without doing damage, and perhaps it costs us much to remove the weeds sent down from the mill owners above us as to cut our own weeds.

695. (*Mr. Harrison.*) Knowing that, would it not be a proper thing to take your own weeds out?—Yes, but I doubt whether any mill owner would do so.

696. (*Chairman.*) Have you paid any attention to the condition of the locks in connexion with the navigation?—The locks are very much out of repair.

697. And the lashers and bywashes?—The lashers wear very little, but the locks, and particularly the lock at Godstow, are very much out of repair—so much so that the water in the reach above can never be kept at regulation height.

698. Is there more or less use of the river for navigable purposes now than when you commenced?—Very much less.

699. Does the use of the river for navigable purposes at all affect the working operations at your mill, beneficially or otherwise?—I think, on the whole, that it would be beneficial to the mill if the navigation were kept open and used very much more than it is now.

700. If you had your choice as a miller as to the abolition of the locks, or as to the re-establishment of them, which would you prefer?—I would rather have them in complete repair, as they were 15 or 20 years ago.

701. But if you could have no locks at all, but could have the weirs regulated, which would you rather have?—Perhaps the latter would be the most beneficial to mills.

702. In the penning of water for the navigation, each lock full of water is a quantity coming down at unequal times?—Yes.

703. But if the navigation were done away with the water would then come down at more regular intervals?—Yes; of course that would avoid the loss in the locks which we have now, but the navigation being almost at an end that loss is scarcely felt.

704. (*Mr. Harrison.*) You have extra wheels, so that you can utilize the flashes as they do at Sutton Courtney; is that the case with the mills below you?—Some mills have not those extra wheels, and of course they must pass a great deal to waste.

705. Then the effect of flashes upon them is that there is a great waste of water?—Yes.

706. If the river were put into a proper condition as to its navigation, so that the water used for passing vessels through the pound locks was the only water used, would not it be a very great benefit to the river?—It would.

707. There is much more waste by the system of flashes than there would be by good pound locks?—Very much more.

708. (*Chairman.*) Do you know what your steam power costs you per horse power?—We spend nearly 1,000*l.* a year for coal—enough to supply 100 horse power, say 12 hours a day, 300 days in the year.

709. What weight of coal would that be?—That would represent about 1,800 tons of coal.

710. You have wages, oil, tallow, and all other etceteras, to add to that?—Yes.

711. And then there is the maintenance of the engine?—You cannot generally reckon much less than 20*l.* per horse per year, putting wear and tear, repairs, and everything.

712. (*Mr. Harrison.*) And engine drivers and stokers?—Yes. That of course depends upon the size of the engines and the number, the greater the number the less the cost.

713. (*Chairman.*) Would you say that your water power had the same value; would you give 20*l.* a year per horse for your water power?—No.

714. What would you give for your water power if you had it to buy, just as you have it existing there; would you give half for it, 10*l.* per horse power?—Yes, I think that it is worth that. Water power is not so valuable as steam power—operations are very often very much delayed in consequence of its being so inconstant.

715. Would you take the trouble to give the point consideration, because it would be very desirable to have a definite answer as to your idea of the relative value of steam power and of water power. You think now that 10*l.* per horse, or half the cost of the steam power, would represent the value of your water power?—Yes.

716. Then, if your water power were entirely done away with, the minimum loss would be 60*l.* per annum, and the maximum loss would be 240*l.* per annum?—Yes, that would average about 150*l.*, which I should think would not be far off the mark.

717. If for any purpose your water power required to be bought out, a capital representing 150*l.* a year would be equivalent to the power which you now enjoy?—I am scarcely prepared to answer that question without giving it more consideration.

718. Do you think that if, by any means which you could adopt, you had full control of the river, you could get the entire volume of power which you require out of it?—No, not one fourth of it.

718*a*. Then, seeing that that is so, if you had to begin *de novo*, without a wheel or anything connected with a wheel, and with no weir, which would you prefer to establish, water power or steam power, of course using the water as now for washing or other like purposes?—I should certainly take advantage of the water power as far as I possibly could.

719. And you would put up these wheels, which give you a varying power of from 6 to 24 horses?—Yes, certainly.

720. And you would put up the weirs?—Yes.

721. Now that there are the facilities of railways and coals, would you still establish water power if you had to build a mill?—Yes, I should.

722. You think that you would do so even now?—Yes.

723. (*Mr. Harrison.*) Is the weir which you repair the old navigation lock upon the river?—Yes.

724. Do you receive tolls for it?—No, it is a free weir.

725. But still you are subject to have to draw water for flashes?—Yes, and also to open it when any boat wishes to go through.

726. Was it always free?—Yes; we open it at all times when a boat wishes to go through; we do not claim the right of stopping the passage of any boat except small skiffs which might be lifted over; the rule is that no boat which can get up to the weir from Oxford, or down from the other way (they cannot always do so) to the weir, has a right to go through immediately.

727. At the mills below, where flashes cannot be utilised as you do it, are not the millers still obliged to send on the water for the purpose of the navigation?—I believe so.

728. Does not that duty appear to be the occasion for their being allowed to raise the old lock dues?—I believe so.

729. (*Chairman.*) Is there a mill drawing from the same head as yours?—Yes, the Wytham corn mill.

730. What relative proportion does it take in comparison with your own?—About one half.

731. What is its power?—Only a little more than 8 horse at the best of times.

732. And what at the worst?—In summer they scarcely work at all. Our mill is more favourably situated to take the water, and we take it from them in some slight degree; we do not stop them, but in summer time the trade of the corn miller is always slack, and the miller attends to his farm instead of to his milling.

733. Have your wheels been altered since your management of the mill?—No.

734. Were the wheels formerly under-shot, ground-shot?—Yes, the old wheels were ground-shot.

735. When were they altered into breast-wheels?—When this mill was built, about 10 years ago.

736. Do you think that you have at all interfered

with the condition of the land on either side of the banks of the river, since the conversion of the wheels from under-shot to breast-shot, by pounding the water ?—Not in the slightest ; the water is never to our knowledge above high-water mark ; if it is, it is immediately lowered by raising the waste gates.

737. Have any of the adjoining landowners complained of the water being penned higher than high-water mark ?—Yes, in some few instances, and the moment they have complained it has been reduced ; but it is generally their own fault, because they frequently nick the bank to their ponds in order to help their cattle to water, and afterwards forget to fill the nick up, and therefore the water gets over their land and floods it.

738. Then the land is lower than the immediate bank of the river ?—It is rather lower.

739. In your opinion is there a great waste of water in the passage of boats, from the peculiar construction of King's weir ?—There is no pound lock at King's weir, only a weir, and so when the gates are open the whole of the reach below has to be filled. If the water was kept at a proper height by the gates at Godstow the fall at King's weir would only be 2 feet, and only so much water as that represents would be wasted ; but now the fall is generally 4 feet, or 4 feet 6 inches, and of course that additional quantity is wasted.

740. Then the construction of a lock for passage of boats at King's weir would contribute to saving water for mill purposes ?—Very much.

741. (*Mr. Harrison.*) The Evenlode, which is a tributary to the Thames, comes into the Thames a little above your mill, does it not ?—Yes, about two miles above.

742. Is there much silt brought down by that river ?—After rain we always notice that the water is very much coloured in the Evenlode—it is almost white, whilst the Thames remains comparatively clear. The Thames seems to come over a clay bed and collects very few impurities from the adjacent strata.

743. There are mills upon the Evenlode, are there not ?—There are.

744. Do the millers there take any steps to cleanse out the river above them ?—Not that I am aware of.

745. How do they clear the ponds ?—They only cut the weed in the usual way.

746. Is there no deposit in their ponds ?—No, I think not. I have never heard of the river being cleaned out.

747. (*Chairman.*) Do the parties at Godstow run the water for fishing at their weir under Godstow Bridge ?—Yes.

748. Is that injurious ?—No, I do not know that it is ; when there is waste water it may as well be run through the fishing nets as not.

749. Have there been any improvements in surface drainage of meadows above your mill ?—Very little ; the fact of their being lot meadows almost places improvement out of the question.

750. (*Mr. Harrison.*) At Hagley Pool, where the river divides, a part coming to King's weir and a part to Wytham, is any arrangement made for the division of the water ?—None.

751. So that the formation of a mud bank by any chance across the mouth of the branch to Wytham would stop all the water of the Wytham miller ?—Yes ; but of course the miller there would take care that a mud bank was not formed. He has power to clean out the river, which he has frequently done to my knowledge.

752. (*Chairman.*) As to these lot meadows could any improvement be made in them ?—Yes, if they were inclosed and a general system of drainage adopted ; but now no one knows that he will have the same land next year that he has this, so nothing is done.

753. Are those meadows subject to flooding from flashes or otherwise from the river ?—Flashes in summer time do not generally rise high enough to affect the meadows, in fact I never knew a case where flashes made a flood.

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754. Are you aware of any portion of the river within the vicinity of Oxford, or within your knowledge, where flashes injuriously flood meadows during the time of making hay ?—I have not heard of a case.

755. Have you practically gauged the volume of the river above your mill ?—Yes, many times.

756. Could you favour the Commission with any ascertained gaugings, giving times and particulars ?—I find that the general summer average, namely, an average not in wet time but in ordinary weather, would be about 8120 cubic feet per minute.

757. The whole volume of the river ?—Yes. That was my measurement at Hagley Pool before the Wytham stream leaves the Thames. In the late dry summer that quantity was reduced to 6849 feet.

758. Do you know what there was in 1859 ?—That is the average which I have taken for a series of years.

759. And what is the flood volume ?—I have selected the year 1863, as I was then enabled to make better observations than perhaps at any other time. On January the 2nd 1863 the river was in its usual state and contained 35,724 feet per minute. On January the 3rd it began to rain, and there was a rainfall of ·25, the volume of the river on that day was 38,906 feet. On January the 4th there was an addition of ·204 rain, and the volume was 47,738 feet. On the 5th the rainfall was ·397, and the volume was 65,318 feet. On the 6th the rainfall was ·584, and the volume was 70,700 feet. On the 7th the rainfall was ·021 and the volume was 78,000 feet. On the 8th there was no rainfall but the flood got to its highest, and there was a volume of 82,500 feet. After that the flood began to abate.

760. (*Mr. Harrison.*) How did you measure these quantities ?—I took an accurate section of the river at every five feet to obtain the sectional area : I then took the surface velocity multiplied by ·83 as a mean, and multiplied it by the area.

761. Did you take the velocity at different points across the river ?—Yes, at three different points.

762. (*Chairman.*) Then that maximum was about 10 times the ordinary volume ?—Yes, 10 times the ordinary summer volume and 2½ times the ordinary winter volume, which is 35,724 feet.

763. (*Mr. Harrison.*) Did that flood stop your works ?—As nearly as possible.

764. (*Chairman.*) Was it as great a flood as you ordinarily have ?—I think that that was the largest flood which I have known.

765. You give me the ordinary volume as 8,300, and the volume in summer, at the very lowest period that you have any knowledge of, as 6,849 ?—That is the average of the week including flashes. In four days of the week, we only get an average of 4,500 feet per minute ; but on the other two days we get six hours extra water through flashes, and this raises the average to 6,849.

766. Then your ordinary volume was 8,000 feet and your dry summer volume 7,000 feet ?—The 8,000 feet applies to a series of years. The 6,849 feet applies to the last summer, which was exceedingly dry.

767. We will call it 7,000 feet, and in one case you get a maximum flood of 82,000 feet, 10 times the ordinary amount and about 12 times the minimum ?—Yes.

768. In the case you have mentioned, there was not any extraordinary fall of rain, it was merely extraordinary for its steady continuance ?—Exactly, the total is 1·456.

769. That is nearly an inch and a half in five days ?—Yes.

770. You frequently have an inch and a half in 24 hours ?—Yes, there are cases of it. Of course it is rainfall at the sources of the Thames and its tributaries which would affect our floods and not local rainfall.

771. This was local rainfall ?—Yes.

772. And you do not know what the other rainfall was ?—I should say that it was much in excess of ours.

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773. Then by classing local rainfall and local results you are classing what do not necessarily belong to each other?—I can only give those facts which I had the opportunity of observing.

774. (*Mr. Harrison.*) You can probably tell us whether a heavy rainfall on the Cotswolds has more or less effect than a similar rainfall in the vicinity of the channel of the Thames above you, which is chiefly Oxford clay. In the former case the rain would be falling upon oolites in a very great measure, and in the latter case upon impervious Oxford clay?—A rain in the west of England with a west wind causes the quickest and highest flood.

775. Which do you think has greater effect in causing a flood?—That upon clay would give a greater flood than that upon oolites.

776. (*Chairman.*) Have there been any drainage or other operations tending to shut out this flooding from the meadows which you have spoken of?—None.

777. (*Professor Way.*) I think you said that you used nothing but rags?—Nothing but rags.

778. Are the rags all white rags?—Not all. There are cotton rags and linen rags.

779. They are not the highest class of white rags?—No.

780. What quantity of rags would make 10 tons of paper?—That would depend upon the class—from 12 to 13 tons.

781. Are those rags dusted?—Yes.

782. What is done with the refuse dust?—It is used for manure for the land.

783. After dusting the rags are they boiled?—Yes.

784. With alkali?—With a very small quantity of alkali and a large quantity of lime.

785. That is with quick lime?—Yes.

786. Then the alkali is put in in the state of carbonate of soda?—Yes.

787. Are the rags washed before being put into the engine?—They are boiled in large iron boilers, and they are then put into engines to be washed.

788. They are not at all washed before they go into the engine?—No.

789. I suppose they are washed in the usual way by the passage of the water through the engine?—Yes.

790. Does the water run direct from the engines into the river?—Yes.

791. Have you any subsiding tanks for the water?—No; there is no necessity for that, the rags are so thoroughly cleansed, the lime is so thoroughly blown out from them by the action of the high-pressure steam, that there is but little dirt left for the washing to take out.

792. Is the liquid from the coppers when drained out clear?—Yes.

793. What becomes of it?—It goes into the river, it will not hurt the stream.

794. What is the colour of that liquid?—It is of a white colour, or like the colour of this blotting-paper.

795. Why would it not pollute the stream?—Because we have not found any ill effects resulting from it; the fish would show it if there were any. If we want to get good fish we always go where the refuse water of the mill enters. We sometimes take trout at that point. The only poisonous thing we use is bleach.

796. All the liquid used in the washing process in the engines goes at once into the river?—Yes.

797. I think you use about 1,000 tons of water for every ton of paper?—Yes.

798. And you make 10 tons of paper a week?—Yes.

799. The total quantity consumed will be something like $2\frac{1}{4}$ million gallons per week?—That is exactly our consumption.

800. About 373,000 gallons a day?—Yes.

801. After washing you bleach?—Yes.

802. Do you bleach in the engines?—Yes.

803. Do you add bleaching powder or bleaching liquid?—Bleaching liquid.

804. How much bleach do you use for a ton of paper?—About three-quarters of a cwt. to each ton of paper.

805. Consequently you use about seven cwt. a week?—Yes.

806. What becomes of the material that is left in the solution of the bleach?—That we always bury.

807. That is not thrown into the river?—Certainly not.

808. Do you use any acid with the bleach?—No, but we use a counteracting agent which entirely neutralises the chloride of lime.

809. Is there a quantity of water which it would be impossible to deal with otherwise than by throwing it into the river?—Yes. Attempts have been made to dispose of it otherwise, but without success.

810. In your case have those attempts been made?—No; it would necessitate very large ponds, which very few mills have, and then I question whether they would do much good. The river is not discoloured by the refuse water passing through the mill.

811. Not by the first portions coming from the boilers?—Yes. The immediate action is to discolour the water, but the colour is lost in a few years after mixing with the water going past.

812. The quantity is insignificant as compared with the water in the stream?—Yes.

813. Have any complaints been made?—Never.

814. You have heard no complaints at Oxford?—No.

815. Have you any immediate neighbours?—No.

816. Have you any land connected with the mill?—Yes, we have a few acres.

817. Immediately adjoining?—Yes; there are about 8 acres.

818. What quantity of soda do you use?—About the same quantity as of bleach—about three-quarters of a cwt. to a ton.

819. (*Chairman.*) Are there any other paper mills in the vicinity of Oxford or upon the Thames?—Yes.

820. Are you personally acquainted with any of the adjoining paper mills?—No.

821. Which is the nearest?—The nearest is a mile below Folly Bridge.

822. What do you call it?—There are two mills—the Weirs mill and Hincksey mill.

823. Are you acquainted with any of the mills on the Thames where the Esparto grass is used?—I know that it is used at Eynsham Mill.

824. Are you acquainted with the mode of washing, pulping, and bleaching that material?—The mode is very similar to the mode used with rags, except that chemicals are used in a larger proportion.

825. Is the refuse discharged from those mills more or less injurious than the refuse water from your own mill?—I am not sufficiently acquainted with the process to answer that question; but of course, there being more chemicals used, the refuse, if it goes into the river, must be more prejudicial.

826. (*Professor Way.*) I suppose the soda that you use is not rendered caustic by any process?—It contains about 50 per cent. of caustic. We use lime to give it a caustic quality.

827. You have stated that you make 10 tons of paper with from 12 to 13 tons of material; how do you explain the loss of the 3 tons?—The greatest part of it is lost in the cutting and dusting of the rags.

828. And that, I believe, is used as manure?—Yes, a portion of it.

829. What proportion of it?—That depends upon the class of rags. From some rags not more than a few pounds to a ton, but from others there would be 2 cwt. of dust to a ton.

830. But that does not account for the loss of 2 or 3 tons out of 12 or 13?—There is a further loss in every operation; in the process of boiling the alkali dissolves any portion of woollen rag that is left, and in washing there is a further loss of the small fibres which go off with the waste water.

831. Is it the fact that something like 2 tons of material in some state or other are extracted from the rags and sent with the wash-water into the river?—

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No; at least three-fourths of the loss is in the shape of dust—the total loss is two tons.

832. How much do you say goes into the river?—I should say not more than $\frac{1}{2}$ a ton out of the 2 tons would go into the river in the shape of fibre.

833. Then you would have something like $1\frac{1}{2}$ or 2 tons of material for manure?—Yes, per week; but that is not all loss. When I say that it takes 12 tons of rags to make 10 tons of paper I mean 12 tons as we buy them, but in that there is a considerable portion which cannot be used for our class of paper, and which has to be sold to the makers of a lower class of paper. There would be very likely at least 10 or 15 cwt. out of 12 tons. Then there is the dust, and a small part that is lost in the shape of powder in the washing.

834. (*Chairman.*) Do you utilize the refuse from the rags upon land of your own, or do you sell it?—We use it upon our own meadows.

835. What is its value per cwt. as manure?—Half-a-crown.

836. Not more than that?—No.

837. Have you used any of it in your own garden?—Yes.

838. (*Professor Way.*) You say that you use three-quarters of a cwt. of soda per ton?—Yes.

839. That would be $7\frac{1}{2}$ cwt. in a week?—Yes.

840. What price do you give for the soda?—The soda costs 8*s.* 8*d.* a cwt.

841. Then you use about 60*s.* worth of soda for 10 tons of paper?—Yes.

842. Would that be worth saving if you could save it?—No; the expense of the necessary apparatus would be too great in our case.

843. Are you acquainted with Richardson and Irving's patent for saving soda?—No, but there are several ways of doing it.

844. If you so treated the first and most discoloured parts of the water which come from the rags, would you not remove a great deal of objectionable matter which now flows into the river?—Yes, undoubtedly; but the expense would be so great as to prevent its adoption.

845. We have been informed that the process by Richardson and Irving's patent is not only not expensive but is highly remunerative—that they save half the soda at very little expense?—Yes; where there is a large quantity to deal with I think the soda might be saved profitably, but with the small quantity that we use it would be otherwise.

846. (*Chairman.*) Do you think that paper-making could be carried on if a prohibition were imposed upon you by Act of Parliament similar to that imposed upon gas manufacturers, that you should not foul any stream by refuse?—I scarcely think that it could be carried on on the present sites. There may be sites specially adapted, where there is plenty of room for reservoirs, but generally speaking I think such a prohibition would put a stop to the trade.

847. Supposing that instead of discharging your waste water immediately into the river, you were compelled to find additional engine power to lift it on the adjoining land, do you think that you could find an available area of land to irrigate with that refuse water, and yet carry on your business as now?—I do not think that would be practicable in our case.

848. You say that you have heard no complaints of the fouling of the water?—Not from any person.

849. Neither from fishers nor from riparian proprietors?—No; we have always been careful to keep back anything that would damage the river.

850. Supposing you were not so careful and that you did turn in all the refuse, would it have any injurious effect upon the river?—Yes, we could kill all the fish in the river to-morrow by turning in the refuse to-day.

851. Might not Parliament fairly impose upon other paper makers the restrictions which you voluntarily impose upon yourselves?—Yes, I think so.

852. You think that Parliament might reasonably enact that no maker of paper should so foul the water as to kill the fish?—Yes, I think so. I do not see any necessity for paper makers fouling the water to such an extent.

853. (*Professor Way.*) When you boil in the coppers you boil with a limited quantity of water and the water is run out, is there any reason why so small a quantity should not be kept out of the river?—It would merely amount to perhaps in our case 2,000 gallons a day. It could be kept out of the river easily, but where is the good? there is nothing in it at all prejudicial.

854. If the second or third portions of the water were put on to the rags and run off you would probably think that the greater part of the material to be got rid of was gone, and you might deal with the rest in the engine without much fear of injury, might you not?—There would be but little waste material left after the first portion of the water was allowed to run off.

855. (*Chairman.*) Is the refuse that is passed from your mill in such a condition that you would like to drink it, or use it for watering cattle, or other similar purposes?—Of course the refuse itself I would not drink, but 20 yards below the mill the water of the river is used for ordinary purposes.

856. Do you think that when people are compelled to drink water from a certain source objectionable matter should be allowed to be passed into it?—It is wrong perhaps to turn anything into a stream that will hurt it, but still you can hardly go a hundred yards upon the Thames without finding something wrong, or that is rather repugnant to the senses, and I really think that from a paper mill, conducted as ours is, there is perhaps as little refuse discharged into the river as from a farmyard.

857. Is it your opinion that in the river Thames, with its navigation, its towns, and its manufactories, there must be a certain amount of fouling?—I think so.

858. What is your opinion of still resorting to the Thames as a source of supply for drinking water?—I do not profess to give information except as regards this locality. During the summer months I have read that large quantities of lime have been placed in the Thames at London in order to precipitate the sewage and to purify the water; possibly our lime refuse may act beneficially rather than otherwise.

859. It was done exceptionally in 1859, but neither before nor since. The intercepting sewers will convey the sewage away, and it would not be done again. Does your knowledge of chemistry enable you to say that the mere fact of liming foul water so separates the chemical ingredients in that water as to make it drinkable?—I have always looked upon our own lime refuse as doing little harm, and I have thought it could purify the water, were it not that it had some little dirt amongst it obtained from the rags. The lime itself, I think, could scarcely do any harm.

860. (*Professor Way.*) The water, in fact, of the river is not sufficiently hard as it is?—Adding lime to it would soften it.

861. (*Chairman.*) You are not, I suppose, a sporting man?—No.

862. Are you aware that any trainer of horses or of dogs would as soon think of giving them poison as to give them hard water?—Yes.

863. (*Professor Way.*) What quantity of lime do you use in a week?—We use about 40 bushels.

864. The weight of a bushel, I believe, is about 50 lbs.?—Rather more than that; I think it is 60 lbs.

865. Then it would be about a ton a week?—Yes.

866. Is that the quantity you throw into the river?—No; we make a solution of that—almost a clear solution.

867. You do not use the lime itself?—No, and I should say that not one-tenth of it goes into the river. The great bulk of it is put into a manure heap.

868. Lime is, properly speaking, entirely soluble in water?—Yes, in an immense quantity of water.

869. Half a ton would do the work of a ton if you had good lime, but you are now throwing away a part of the lime?—We cannot find any lime that is so well burned as that; there will always be a large deposit of stony portions which are never slacked.

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870. (*Chairman.*) Do you know enough of paper-making to be able to say whether the refuse from Esparto grass might be kept out of the river as you keep your refuse out?—I do not see that the quantity would make any difference. We have a certain quantity to cart away, and if we used Esparto grass we should have perhaps four times that quantity to cart away. There would be very little presence of bleach in the stuff when properly done; the hypo-sulphate of soda has the property of absorbing and neutralizing the bleach.

871. (*Professor Way.*) To what refuse did you allude when you spoke of the refuse that you could throw into the river?—I alluded to the bleach entirely; we dissolve a very small portion of it, perhaps not one-tenth.

872. (*Chairman.*) Have you at any time passed that into the river?—No, at no period.

873. Was that at your own option or in pursuance of instructions from your employers?—My own option.

874. You have exercised your own judgment, and kept the bleach out because you knew it would be injurious?—Yes.

875. Do any of the paper-makers upon the Thames, making paper similar to your own, adopt the same precautions?—I do not know.

876. If they do not, is it your opinion that they ought to be restrained?—Yes, I think so.

The witness withdrew.

Dr. R. L. Cotton.

Dr. RICHARD LYNCH COTTON examined.

877. (*Chairman.*) You are Provost of Worcester College?—Yes.

878. The college owns a certain meadow called Worcester Meadow?—Yes, Worcester College Meadow.

879. Do you know the acreage of it?—It is 7 acres, including the plantation; the meadow has a plantation upon it.

880. That meadow is liable under certain conditions to be flooded?—Yes.

881. There is an outlet drain from the meadow into the mill-race leading to Mr. Morrell's brewery?—Yes.

882. Have you reason to think that the occasional impounding of the water at Mr. Morrell's brewery causes a flooding upon your meadow?—Yes, it has done so at times.

883. Has it injured the grass?—Yes, it has made it more rough; and it has likewise come in at hay time, and it has injured the hay. That must have been about 1844 or 1845.

884. Has there been any injurious flooding since that time?—Yes, a great deal; but we have not examined into it. Last year it was worse.

885. Have you employed any engineer to examine the condition of the brewery and the works intervening between your meadow and the brewery?—No.

886. Did you last year give any notice to Mr. Morrell to cease from causing the injury?—No.

887. Have you had it in contemplation to attempt to restrain him legally from doing this injury?—No; a good many years ago there was a lawsuit which came to a compromise. The terms were that Mr. Morrell should not raise the water above a certain height.

888. Have you any reason to believe that Mr. Morrell pens back the water at a higher level now than that agreed upon?—I cannot venture to say; but seeing the water there, we have at times fancied he did.

889. The canal is between Mr. Morrell's brewery and your meadow, is it not?—Yes, there is a culvert under the canal.

890. If a self-acting flood flap were placed upon the mouth of that culvert next to Mr. Morrell's brewery-lead or conduit, it would prevent the water coming on to the meadow at all times when the water was higher on Mr. Morrell's side?—But that would impede the sewage, and the meadow would be then flooded with sewage. A little while ago the whole became blocked up, and we were in a dreadful state.

891. When the award was made did you attempt to put it into force?—No, we have never taken any legal action since that time.

892. Nothing has been done?—No.

893. If there is a line of main sewer to go through your grounds at a considerable depth below the surface, and you are to have the privilege of passing subsoil and surface water into it, the probability is that your grounds will be effectually drained?—Yes, that is possible.

The witness withdrew.

Dr. C. G. B. Daubeny.

Dr. CHARLES G. B. DAUBENY, Professor of Botany, and formerly Professor of Chemistry in the University of Oxford, examined.

894. (*Chairman.*) How long have you been resident in Oxford?—All my life, about 50 years.

895. How long at the Botanic Gardens?—I became Professor in 1834, and I began to reside in the house when it was built; 25 years ago and more.

896. Do you suffer more now from the sewage of Oxford than you did at the commencement of your residence there?—Certainly; before I began to occupy the Botanic Gardens, and to build a house there, there was a culvert. The land belonged to the city and the citizens allowed me to have it, but stipulated that the culvert was to remain. The quantity of sewage discharged through that culvert is much greater now than it was, so much so, that the river immediately under my house is the receptacle for the greater part of the sewage of Oxford. If I had anticipated this before I built the house, it would have been a consideration with me whether I should have built it at all.

897. What is the name of the tributary stream that the sewage runs into?—The Cherwell.

898. Has that been particularly offensive this summer?—Not so much this summer, but the reason of that is, that the citizens have felt it necessary, for the health of the town, to remove the accumulation of filth immediately below the outfall of the culvert, and since that was done no doubt the stream has been a little less offensive, at least my servants tell me so; they say that this summer they have not been aware of anything offensive, while in former years there was a great deal that was offensive, and of course the evil will come again, supposing this matter is not removed.

899. You mean that the Cherwell has been cleansed?—Yes, that part of it immediately under the culvert is cleansed from necessity every two years.

900. Have you at all investigated the question of the extraordinary growth of the new American weed that is blocking up all the rivers?—It was introduced somehow or other into Oxford, and it has increased very much.

901. Are you able to state what class of stream is best calculated to develope its full growth?—The water must be either stagnant or slowly moving. The weed will grow upon the sides of the Isis but not in the centre; in a rapidly flowing stream never, I think; but in such streams as those in Cambridge and in Ely it is very abundant; all the ponds about Oxford are proofs of it, the river must not be deep.

902. There are certain plants which have a very extraordinary development in water tainted by sewage, do you know whether this particular plant is one of them?—I cannot say; I only know that where there is no sewage the weed grows most abundantly, for instance, in the ponds round the fountain in the Botanic Garden, there is no sewage there; the water

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comes fresh from the waterworks, and yet this weed grows most luxuriantly there.

903. I have heard it asserted that the weed is dying out, that it appears to have exhausted the rivers in which it has been most mischievous, and is not so bad as it was; do you know anything as to that?—I cannot say anything from my own knowledge, but I think it is quite as bad as it ever was in the Gardens. We cannot eradicate it; we clean out the ponds twice a year, and suppose that we have removed every vestige of weed, but still a little remains, and from that the pond is again covered, every fresh shoot will propagate it; the two sexes do not appear to be introduced, it is only the male or the female (I forget which) by which it is propagated.

904. There are certain plants, I believe, that will exhaust the material of the soil upon which they grow; they will be very productive, very rank and rife for a certain period, and then gradually die out; do you know whether this weed is one of them?—I do not think it is.

905. Then any person who has formed the opinion that the American weed will wear itself out in the river has formed that opinion upon insufficient grounds?—I should think so. I understand that the American weed is not a nuisance in America. The same thing has occurred with the watercress in New Zealand; it is no nuisance in this country, but in New Zealand I am told it has become so rampant that it is as great a nuisance there as the American weed is here.

906. (*Professor Way.*) As the river is used to supply the metropolis of London with water, I presume you would consider it objectionable to turn the sewage of this town into the river?—It would be objectionable, and we should lose all the profit that might be derived from the sewage. If there are any inhabitants near Sandford they would be affected by it, but the evil would be infinitely less there than it is here, because you know very well that in the course of its flow the water gets rid of much of the sewage matter, which is converted into nitrates, and by that means nature adopts a method of doing away with the nuisance.

907. But as a chemist, and as a man of ordinary common sense, would you trust to that means entirely?—I would much rather not trust to it.

908. If you had to drink the water in London, would you think it safe to trust to that means of getting rid of the impurities of Oxford?—I should certainly much prefer seeing it used on the land, or deodorized in some way. I think if poured in at Sandford it would be an evil, but much less than that which now arises from pouring it into the river under a very leading thoroughfare of the city, as has been the case for the last 20 years. I may also say that not only is there a great accumulation of solid matter deposited at the mouth of the culvert, but I have taken up the water there and found the process of putrefaction going on very rapidly. I have had samples of the water obtained for the purpose of investigating the nature of the water.

909. (*Mr. Harrison.*) Should you consider that by merely deodorizing the sewage you would remove the causes of offence with regard to the supply of water to London?—I think that the sewage might be so deodorized as to be inoffensive and probably innocuous—certainly inoffensive—it is not absolutely proved that by being inoffensive it would be innocuous, but it is highly probable that it would be. The water of a well may apparently be pure and palatable, yet it does not follow that it may not contain a specific quantity of sewage matter which will be highly injurious, and indeed so bad as to produce an epidemic, under certain circumstances.

910. Will mechanical filtration through sand and gravel sufficiently for drinking purposes purify water that has once been contaminated with sewage?—I think if it were continued long enough it might, but I should hardly like to trust to it; it is the aëration and the oxidation of the water which cause the noxious qualities to disappear, and therefore it is a very good plan to filter water.

911. Do you know, as a matter of fact, whether the water of the ocean can be filtered into fresh water?—I do not believe it, although it has been so stated. I conceive that the salt may be diminished rather, but the water not entirely purified.

912. (*Professor Way.*) If at Teddington lock, or that part of the river from which we obtain our water supply in London, it was found on analysis that the water did not contain an extraordinary quantity of organic matter, not above the average, would that prove that the water was in a fit state to be used for drinking purposes; or is there any point at which organic matter ceases to be injurious or becomes injurious?—I think that a very small quantity of organic matter, under certain conditions, would be capable of producing very noxious effects.

913. Have chemists the power of saying that water is positively unwholesome from its containing an excessive quantity of organic matter, or that it is positively wholesome because it does not contain an excessive quantity?—I think that they could not define the quantity.

914. Is it possible that river water containing two grains of organic matter in a gallon drawn from sewage in the upper parts of the stream may be improper water to drink?—I think that that is highly probable.

915. The organic matter may be derived from two sources, vegetable and animal, do they have an equal influence in a sanitary point of view?—No, I should think that animal matter would produce the worst effects; vegetable matter seems rather to produce malaria, but to do that it must be in large quantities, and there must be certain conditions of heat; but epidemics are favoured rather by animal matter than by vegetable matter.

916. Generally is it proper that the supply of water for a town, no matter what it is, should be derived from a river into which large quantities of animal excreta are avowedly thrown?—Certainly not.

917. Can you tell me whether any filtration that I can perform at home in London will put me beyond the suspicion of drinking some of the refuse of Oxford?—I should say not.

918. (*Mr. Randall, through the Chairman.*) What is the effect upon water of nature's main scavenger—the vegetation in the river?—It would remove a small quantity, no doubt. For instance, that stagnant ditch in front of the Botanic Garden is not so offensive as one would expect it to be, owing to its being covered with confervæ; but if there was much sewage there I do not think that the confervæ growing there would remove the noxious qualities.

919. (*Professor Way.*) It would depend, I suppose, upon how the balance was adjusted between the generation of the gas and the absorbent power of the vegetables?—Yes.

920. That would be a very unsafe thing to depend upon?—Yes. I may mention that although I cannot put my finger upon any decided case of illness which has resulted from discharge of sewage into the Cherwell, yet it was the opinion of my doctor that my own serious illness was owing to it; therefore, although it is not proved, yet it is very probable that evil consequences have resulted from the accumulation of sewage on that public part of the stream.

921. Have you not in former years had to shut your windows to keep out the smell?—Yes, and Mr. Fisher, the builder, will tell you that he has found the smell so offensive that he has felt quite sick.

922. Do you think that any person might drink with impunity water out of a ditch simply because it happened to have vegetation in it?—Certainly not.

923. Is it not the fact that there are certain mountain streams in which the water is particularly good, and yet there is a total absence of vegetation?—Yes.

924. (*Chairman.*) Is it within your knowledge that streams absolutely poisonous for human purposes may produce vegetation?—Yes, certainly; and a stream so impregnated with animal matter as to be highly

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injurious to animals would be most favourable to vegetation. Nature appears to have adopted that means of lessening the evil.

925. Is it also within your knowledge that water highly charged with mineral matter, for instance, a solution of copper, would not kill vegetation of a particular kind?—Certainly; but it would be very injurious, I should think, to most kinds.

The witness withdrew.

Mr. William Ward examined.

Mr. W. Ward.

926. (*Chairman.*) You are a member of the town council of Oxford?—Yes, and have been for 20 years, and an alderman.

927. You are at present chairman of the Local Board of Health of Oxford?—Yes.

928. You are an owner of land in the suburbs?—Yes, just above Worcester College grounds.

929. You know the general condition of the city and its suburbs?—Yes.

930. Have you paid any special attention to the condition of the Thames and its navigation?—Yes; I have worked boats on it for a great many years, and have been connected with it by trade in various ways.

931. You are aware that the navigation above Oxford is in a very ruinous condition?—Yes, very.

932. And below Oxford?—Yes; the locks and weirs are getting into a very bad state.

933. Are you a Commissioner for the river Thames?—I am one of them. I was for two years one of the committee for this upper district.

934. The commission, I believe, is in debt?—Yes.

935. Do you see any prospect of getting out of your debt under existing circumstances?—I see no possibility of it, for what we collect now is so small. I do not think there will be any money to pay the bondholders.

936. Do you see any prospect of getting further into debt if you have to spend money?—We cannot do it. We have no power to borrow money, and things have come to a regular fix altogether; the Commissioners now in fact are obliged to suspend all expenses.

937. Having had an interest in the trade of the district and having used the navigation of the Thames, what is your opinion with regard to the restoration of the navigation above Oxford?—We have the railway now to bring what we used to bring chiefly by water from Gloucester to Oxford. The Thames and Severn canal was made to Lechlade when the Commission was issued some 80 years ago. There was a great trade then with Gloucester, and also in coal from the Forest of Dean to Oxford; even within the last 20 years we used to bring something like 3,000 or 4,000 tons of coal to Oxford from the Forest of Dean in the course of the year. The navigation was so good that I have had a vessel from the Forest of Dean brought across the Severn to Oxford of 110 tons burden—vessels of 80 tons frequently. I have had three and four barges down from the Forest of Dean loaded that came across the Severn and were brought to Oxford.

938. What tonnage could you bring now if the locks were in good repair?—That depends, of course, upon the water, but I believe I could bring now 30 tons, or a full boatload, because the river is quite full.

939. What could you have done during the past summer?—From the deficient state of the locks nothing at all. I believe I was almost the last person who brought any traffic from Gloucester to Oxford. I used to bring slates, but I found there were such obstructions, that having a railway from Gloucester to Oxford that enabled me to bring things cheaper, I gave up the river trade. I think the navigation may be considered at an end from Lechlade to Oxford, there is a little trade to Farringdon. I see no probability of any trade again from Gloucester through Oxford to London; but if the navigation is to be kept up in the lower part below Oxford the upper part must be attended to, because we get our water from there in order to send the boats down from Oxford. There must be a reservoir, or water must be penned up above Oxford to enable the navigation to go on down to Reading.

940. (*Mr. Harrison.*) Are floods ever occasioned by flashes?—Yes. My experience is that constantly year after year, when we had the trade here, there was scarcely a year but what we flooded the meadows with our flash, that is, in the very driest time, when you might walk across the river. I used then to bring the barges down from St. John's Bridge at Lechlade, they could not start from Lechdale without a quantity being penned up, and when we got it, it was such a flood (even when the hay was about) that it flooded the whole country, and along the towing-paths I have seen the horses' fetlocks covered with water in the driest season.

941. What was the value of the traffic relatively to the property that was flooded and injured?—One can hardly say what we brought, and I can scarcely tell the extent of country that was flooded.

942. If you were earning 1*l.* on the river you were damaging the landowners to the extent of 100*l.*?—Yes, all the way down the banks above Oxford are almost level with the river, in fact there are no banks. If we take a flash from here down to Wallingford and Reading the banks are kept up, so that we do not flood the country; but above Oxford, unless a great deal of money was expended and the banks raised, the country must be flooded by flashes, and the traffic will not be sufficient to bear that expense.

943. Your experience of floods from flashes was at a time before Mr. Stacey was at Wolvercot mill?—Yes, there has been no trade since he has been at Wolvercot.

944. (*Chairman.*) What was the cost per ton of navigating the river from the points you have named down to Oxford?—From Gloucester to Oxford it was 9*s.* a ton.

945. What is it now by railway?—Not more than 7*s.*, I think, for coal and slate and heavy goods.

946. Do you think it would be possible to revive the navigation of the Thames so as to come into profitable competition with the railway?—Decidedly not, not from above down to Oxford.

947. Therefore if the navigation is restored, it must be for purposes connected with the river proper, and not with any hope of gaining a remunerative income from the improvement?—Not from Gloucester to Oxford.

948. Is that on account of the heavy tolls?—I think the whole tolls from Gloucester to Oxford, including the Thames and Severn canal, are not more than 5*s.* a ton. The great expense of the navigation is in hauling, the cost of bringing down the boats with horses. The lock charges all the way from Lechlade to Oxford I think could not be reduced; but even if there were no lock charges at all the expense of the hauling would exceed 4*s.* a ton. So the navigation cannot compete with the railway under any circumstances from Gloucester to Oxford. I suppose the distance is something like 70 miles to Gloucester by water.

949. What time would it take you to transmit materials by water, and what by railway?—If I had a cargo of slates or a cargo of coal to fetch from Gloucester, and I started a boat from here it could not be back here under 10 days.

950. Or 240 hours?—Yes.

951. What is the time occupied by the railway?—I get it in 48 hours. I should say that if a vessel comes into Gloucester we can get the trucks and load them out of the vessel and send them off so as to arrive at Oxford the following morning.

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Mr. W. Ward.

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952. With heavy goods is it of much consequence whether you get your goods in ten days or in two days?—Not at all, in articles like coal and slates.

953. Are you a director of the Oxford canal?—I am one of the directors.

954. Is the Oxford canal a joint-stock company?—Yes.

955. Is it returning a dividend?—Yes, we receive 8*l.* 5*s.* a year per share.

956. Upon what capital?—A 100*l.* share is worth about 156*l.* now.

957. (*Mr. Harrison.*) Is much coal brought by the Great Western Railway now from Gloucester to Oxford?—A very small quantity indeed.

958. Therefore the railway which brings coal from Gloucester to Oxford does not come at all into competition with the canal?—Not at all.

959. The Great Western Railway, then, between Gloucester and Oxford, is not the cause of doing away with the river traffic between Lechlade and Oxford?—Decidedly not.

960. The coal, I believe, is chiefly brought from the Midland counties?—Yes.

961. What distance is it from here to the coal districts?—About 80 or 90 miles.

962. Is much of that coal brought by the Oxford Canal?—Yes.

963. Is the Oxford canal able to compete with the railways in the carriage of that coal?—Quite so; it does compete. There is exactly the same charge made by one as by the other.

964. You have navigated your boats from Oxford to the Forest of Dean for coal?—Yes.

965. Are you aware that there are great difficulties, not only in the navigation of the Thames between Oxford and Lechlade, but also from the Stroudwater Canal across the Severn to Bull-o'-Pill on the Severn?—Yes.

966. And that there is great detention of the boats in crossing the river Severn?—I do not know whether it is so now; but what has driven the Forest of Dean coals away has been the reduced tonnage that we pay now by railway.

967. It is a fact that traffic in coal from the Forest of Dean across the Severn is a very uncertain traffic; and are you aware that there was an Act passed last year for the construction of a railway from the Forest of Dean to Stonehouse?—Yes.

968. To join the Midland Railway?—Yes.

969. Are you aware that in that Act of Parliament provision is made that coals brought by that railway are to be shipped at a landing place on the Stroudwater canal at this side of the Severn?—No, I am not aware of that.

970. That would get rid of all detention from the Severn?—Yes.

971. The coals are at present carried by railway from collieries down to ports on the Severn?—Yes.

972. The construction of this railway will bring them to the Stroudwater canal instead of to the Severn?—Yes.

973. There is no uncertainty in the traffic on canals?—No.

974. Whereas there is great uncertainty in tidal rivers like the Severn?—Yes.

975. That uncertainty with regard to the Severn will be got over by the construction of this railway?—Yes.

976. When coal can thus be brought across the Severn to Oxford at a shorter distance than coal from midland county coal fields, is it not possible that a traffic may spring up with the Forest of Dean which may be very useful to Oxford and desirable to encourage?—Do you mean that coals should be brought over Stroudwater Canal by boats to Oxford?

977. Yes?—I should doubt that; the railway from Stroudwater to Oxford will beat the river trade.

978. It does not appear that at present you get any coal from the Forest of Dean?—No; but I do not think it will come down the river from Lechlade.

979. You say that the distance from Oxford to the midland counties coal field is about 90 miles?—Yes, 89 miles.

980. Over those 90 miles the canal does compete with the railway?—Yes.

981. The distance from Oxford to the Forest of Dean is only about 60 or 70 miles?—The railway you mentioned will not diminish the extent to be traversed on the river. It is 40 miles from St. John's Bridge to Oxford, and besides that, there is the distance along the canals. I think the cost of such navigation will quite stop any coals. If you were to propose to bring coals from the Forest of Dean by railway it would do very well, but I do not apprehend that it would answer to put them on boats and bring them to Oxford. You could not get the boats down, I think, under 4*s.* a ton, by hauling.

982. What is the distance from Oxford to Stonehouse?—The distance from Stonehouse to Lechlade is something like 14 or 15 miles by the Thames and Severn canal; it is a fine barge canal, capable I think of bringing any quantity. I think you might bring 100 tons along that canal.

983. The question is whether the river, considering such a trade is in prospect, should not be put into a proper condition?—Yes; but I never considered that coals would come in that way at all.

The witness withdrew.

Adjourned till to-morrow at 10 o'clock.

Oxford, Friday, 3rd November 1865.

PRESENT:

ROBERT RAWLINSON, ESQ., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

Mr. ROBERT DOWNING examined.

OXFORD.

Mr. R. Downing.

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984. (*Chairman.*) How long have you been engineer to the waterworks for supplying the city of Oxford?—About 15 months.

985. What length of time have the Oxford waterworks been established?—The present works were established about 1856.

986. Who are the owners of the waterworks?—They are the property of the city of Oxford.

987. Is the water supplied by gravitation or pumping?—By pumping. The water is pumped from a lake which was originally formed by the Great Western Railway Company when taking gravel to form the ballast for their line.

988. Will you describe, as shortly as you can, the relative position of the works to Oxford?—They are south of Oxford, I suppose about three quarters of a mile from Carfax. At the commencement they had two 30-horse power engines for lifting the water.

989. Are they high pressure or condensing engines?—Condensing engines.

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990. Are they rotary?—They are rotary. As the demand for water increased another 60-horse power engine was erected, which is also a rotary and condensing engine. These three engines constitute their present pumping power.

991. You have 120-horse power altogether?—Yes. We do not work all the engines together, but work the two small ones and the large one alternately.

992. Do you find 60-horse power sufficient for your purposes?—Yes.

993. About what area is the side cutting, or gravel pit, out of which you pump the water?—From 11 to 13 acres.

994. And of what average depth is the water in the lake below the Thames?—I do not know. I must mention that we can also run water into the lake through the ditch which comes from Ferry Hincksey, through the meadows. We clean that ditch, and at any time (for instance, in the hot months of summer), when we want a further supply of water than we have in the lake, we can turn the water from the ditch into the filter beds which we have constructed on the side of the lake; we can thus at any time obtain water direct from the river itself, above Oxford.

995. What area of filtering bed have you?—I should think about half an acre.

996. What depth of filtering sand have you from the surface?—About 18 inches.

997. Who constructed them?—I presume my predecessor.

998. What was his name?—Mr. Jones. They have not the usual courses which filters have, and they are not cleaned in the usual way in which filters are, but the stuff is simply loosened by being dug over. The water comes down pretty pure from the ditch, so that no absolute filtering is generally required; all we have to do is to keep out leaves.

999. You might designate it as a strainer rather than a scientific filter?—Yes, and I presume that that is what it was intended for.

1000. Do you know whether animal or wood charcoal has been used in the construction of that strainer or filter?—I am not aware of any having been used.

1001. How many pumps have you?—With the two original engines, the two of 30-horse power, we have two "bucket and plunger" pumps of $23\frac{1}{2}$ inches diameter.

1002. What boilers do you use?—We have tubular boilers about 30 feet long and 6 feet in diameter.

1003. What material do you burn, coal or slack?—Coal.

1004. At what price per ton?—12*s.* 6*d.*

1005. How many tons a day do you consume?—About two tons, rather under than over.

1006. What heads are you working against?—In the morning we generally work up to about 100 feet, towards the afternoon, from 2 to 4, we shut off a portion of the town, in order to supply some higher services, such as the Infirmary. During that time our pressure gets up to about 120 feet.

1007. How is that measured in pounds?—We have a pressure gauge in the engine house.

1008. But upon a portion of the main you have an escape valve?—Yes. I do not know what that is weighted to. We have got the weight as close to the end of the lever as we possibly can at present.

1009. Excepting what is shown by your pressure gauge you do not know what pressure you put upon your main?—No.

1010. Have you ever noticed the amount of oscillation upon that pressure gauge when you are working?—It is very steady.

1011. You have a large air vessel?—Yes, about 12 feet high.

1012. Have you ever had any difficulty in working—any burst pipes or giving way of the joints?—Not since I came; before I came I believe some joints were blown out, but I think that that was from the fault of the contractor.

1013. I suppose that all your joints throughout the city are lead joints?—Yes, entirely.

1014. Are your engines horizontal or beam?—All three are beam engines.

1015. Do you know what are your annual working expenses for coal, stokers, oil, tallow, and superintendence, have you to make out an annual statement?—Yes. I should say that the expense is about 15*l.* per horse per year.

1016. And you measure that by 60 horse?—Yes.

1017. That is from 900*l.* to 1000*l.* a year for your working expenses?—About that.

1018. (*Mr. Harrison.*) Does that include depreciation?—It includes general repairs.

1019. (*Chairman.*) If an engine breaks down or wears out, or a new one is required, you do not consider that you have provided in that estimate for a reserve fund to renew it?—No.

1020. It would have to come out of fresh capital?—Yes.

1021. Do you know what income is derived by the rental?—It has been about 3,000*l.*, it is now rising a little. I have assumed the population of Oxford to be from 30,000 to 32,000, and I have assumed the number of customers to be about 18,000, but that is a mere guess.

1022. That is a little more than a moiety of the population?—Yes, that would give about 61 gallons per head.

1023. (*Mr. Harrison.*) That is a large supply?—Yes.

1024. (*Chairman.*) Have you noticed the condition of the balance valve which is fixed below Folly Bridge, and the waste which takes place there?—I have, and I have frequently of late lifted that valve to blow out the water there. Owing to our contractor originally putting too little lead into the pipes, there have been one or two accidents through the lead joints being blown out. On one occasion when the floods were out the lead was blown out of the pipe and a great deal of gravel got in, consequently our pumps were a great deal injured and more or less gravel got into the main, and I have no doubt that there is still gravel lying in places in some of the mains, and I fancy that it keeps working up and at times jams the valve. The water escaping at that valve is frequently rather due to the valve being jammed open by the gravel than to any pressure of water.

1025. Had you any experience with waterworks previously to your appointment here?—In the designing of waterworks I had, but not in the practical management of them.

1026. Do you know any other works constructed upon a similar principle to those at Oxford; I mean, where the pumping is direct from the mains without a stand pipe or a head reservoir?—I do not know of a case.

1027. Has it occurred to you that there might be a saving of power and an advantage if you had a reservoir with sufficient head, or some means of giving a pressure without pumping direct against the main?—I think that our present system of pumping dead against the main is a very bad plan. In consequence there is at times a very great strain put against the engines, and I believe that what you mention has been in contemplation by the trustees.

1028. I suppose that you find an excessive cost in fuel?—Yes. The present system presses the mains without any advantage in supply and with a positive injury to the mains.

1029. And to the engines?—Yes.

1030. What is the diameter of your 60-horse pump?—24 inches.

1031. What is the diameter of your main?—16 inches.

1032. What stroke is the pump?—Three feet.

1033. It is one half the beam?—Yes.

1034. Double action?—Yes.

1035. About how many strokes are there per minute?—From 13 to 14, 14 is the maximum.

1036. (*Mr. Harrison.*) For how many hours?—13 hours, and 6 on Sundays.

1037. (*Chairman.*) What is the velocity through your 6-inch main?—I have not calculated it.

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1038. The supply is intermittent. You have no supply when you are not pumping?—We have no supply when we are not pumping, it is so far intermittent.

1039. Have you men all night upon the ground ready to get up steam in case of fire?—Yes.

1040. You have had fires?—Yes.

1041. Have you been quick enough to be of service?—Yes.

1042. Have there been any complaints as to slackness of supply?—There have been frequent reports, as there will be, I suppose, in all towns. The fire engines and the waterworks may not happen to be on the spot at the same time.

1043. There have been complaints?—There have been reports that the water has not been on when the engine was there; but I can state from my own experience since I came that those reports have not been true, certainly not to the extent to which they were made.

1044. A fire is a very quick thing, and if news has to be taken to the engine house, and a man has to get up his steam, much time may be lost?—The steam is always up and we can start the engine immediately

1045. Even then it would take some time to give the working head of pressure?—Yes, but we have an auxiliary supply from the market tank. We receive notice at the waterworks office first, a man then proceeds to give notice to the engineman, and during that time the turncock turns on the market tank, so that he charges the mains before the engine is started.

1046. Do you know what height from the surface the water would rise from one of your mains, in the centre of the city, when you are at full work?—That would be very variable, according to the season of the year. The street watering is always a heavy pull upon it; if there was a water cart near when we drew our plug the water would rise a very small height. I think that on one occasion when there was a fire the water rose through the plug-hole from eight to 10 feet on Carfax.

1047. Could you, under any circumstances, throw water over the highest colleges by the pressure upon the main?—I am afraid not.

1048. If the whole city volunteered to take water in the proportion in which it is now taken from you, your works would evidently not be sufficient to supply that want?—No.

1049. In that case you would have to erect additional works?—Yes; that is, assuming that the consumption went on at the same rate.

1050. Do you supply any water to the Great Western Railway Company for locomotive purposes?—Yes.

1051. What do they take per day from you?—It is not measured, they pay 90*l.* per year for it.

1052. What volume, upon the average, is taken for street water in hot weather?—I do not know.

1053. Is any payment made for that?—The commissioners pay for it 375*l.* a year.

1054. Do you think that the streets require as much water as the railway?—At present I have no doubt that the commissioners for the street watering use much more than the railway does

1055. Are there baths and washhouses in Oxford, and is the water used for that purpose?—It is used for the baths at St. Clement's.

1056. Is that a private affair?—Yes.

1057. Do they pay for the water?—Yes.

1058. What do you charge them for the water?—5*l.* a year, that is, only for a season of the year.

1059. Is the charge for water supply to hotels and other buildings a rate upon the rental or a bargain?—A rate. We charge 6*d.* in the pound upon all houses or places of business up to 20*l.* rental, above 20*l.* rental we charge 6*d.* in the pound up to 100*l.*, above 100*l.* there is no increase of rate for private houses. As regards places of business, we take off one-fifth of the gross rental for all houses above a rental of 20*l.*, that is, for house service only. We charge water-closets extra; in the case of houses above 25*l.* rental we charge 10*s.* for the first closet, and 2*s.* 6*d.* for the next succeeding one.

1060. Do you charge anything for a bath?—Not generally.

1061. Do you charge for carriage washing or for horses?—Yes.

1062. Have you a published scale of charges for that?—No, there is merely a private scale in our own office.

1063. Are the works established by an Act of Parliament?—We have no Act of Parliament.

1064. Do you supply any of the colleges?—Yes, several.

1065. All of them?—All of them have taken water, I think, more or less; some have it only for water-closets, some have it for the Principal's use only.

1066. Have you had your water analysed?—Yes, before I came, but not since. I can let you have a copy of that analysis.

1067. (*Professor Way.*) By whom was it made?—By Mr. John Thomas Cooper, in 1850. At that time the hardness of the lake water was 12·6.

1068. (*Chairman.*) Who constructed your engines and works?—Messrs. Simpson constructed the 30-horse engines, and the Butterley Iron Company the 60-horse.

1069. I daresay you agree that it would be desirable for the corporation in revising their works to have a high-service reservoir and a larger main?—I should decidedly recommend a high-service reservoir.

1070. And a larger rising main?—That would be a question of cost. At all events I should recommend a larger main to start with, and to run up to Folly Bridge, even if we did not enlarge the size from that point and removed the existing main higher up.

1071. (*Professor Way.*) Do you know the hardness of the water of the river as near this lake as may be?—I have another analysis by the same gentleman, and there the railway lake water is given as having 12 degrees of hardness; and St. Giles's water, which I presume is pump water, has 27·6. I presume that that is from a well. The river water during a flood had 13·8. degrees.

1072. (*Mr. Harrison.*) And Sandford Brook has 18?—Yes.

1073. (*Chairman.*) Is that a brook from which you take water?—No.

1074. (*Professor Way.*) Practically, you suppose that the water which you pump from the lake is the river water?—Yes.

1075. (*Mr. Harrison.*) Do you find that the water in the lake varies in head with the water in the river?—Yes.

1076. Are they at the same level now?—No, the lake is considerably lower. We always keep out the ditch water in a flood.

1077. If you do not let in the ditch water, where does the remainder of the supply come from?—It percolates through the gravel.

1078. Where does it come from?—From all round; the water in the lake would in course of time rise, but we are constantly pumping, and it does not come in so fast so as to get as high as the river. I do not think that it is ever so high as the river.

1079. We have had it in evidence that there is a hard bed at the bottom of the river which is impervious, and which lies above the gravel; if so, your supply might be from a source which is independent of the river?—I am not sufficiently acquainted with the locality to say, but I should scarcely fancy that the river bed at any point is absolutely impervious; there may be, perhaps, little spots of clay which are so, but I should be rather inclined to doubt it.

1080. Would there be much difficulty in forming a reservoir in some position above the town, so as to supply water without pumping?—I do not know of any place where you could do so.

1081. Not at a moderate distance?—Not at a moderate distance. Headington Hill would be the only place where you could go, and I do not know where you could get water there which would answer the purpose.

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1082. (*Professor Way.*) Are the inhabitants tolerably satisfied with the quality of your water?—I believe that they are very well satisfied with it.

1083. (*Chairman.*) Have you anything to add to what you have already stated?—I have samples of three weeds (*producing the same, covered with little red animals*). One of those weeds grows in a ditch where waterclosets discharge.

1084. (*Mr. Harrison.*) It runs at the back of a row of houses?—Yes; and there is the waste water from the engines also—the water in that ditch is not used at all for water supply.

1085. (*Professor Way.*) Do you think that water in which that weed is growing would be satisfactory as a source of drinking water?—I do not think that the weed itself would do any harm.

1086. Does the fact of its being there prove that it is fit to drink?—It cannot be very bad, I think.

1087. (*Mr. Harrison.*) Is this an average specimen, or have you collected some little animals?—I was not aware that the animals were there till I got to my office. I have been told that the American weed will not grow in water more than 4 feet 2 inches in depth; the average depth of our lake is deeper than that, but we do not have the weed on the shores of our lake.

1088. I suppose that this animal life is partly owing to the warmth of your water?—Yes; we have also leeches, which come up that ditch just at the point where I got that weed.

1089. (*Chairman.*) If you doubled your pumping power would there be water sufficient from your present sources?—I have had so short an experience of the capabilities of the lake that I should scarcely like to answer that question positively; but I am very much inclined to think that with a slight alteration in our suction pipe, and by deepening the lake at our pipe and putting a sheet piling, we could pump much more water than we now do.

1090. Do you ever lower the lake so as to show signs of exhaustion—in dry weather, or when you are pumping severely?—For the greater portion of the summer of last year, I was loth to try any experiments with the lake as regards its capabilities, and therefore I used the filtered water from the ditches whenever I had an opportunity. During this last summer I have had more confidence in the power of the lake itself, and I have used comparatively little filtered water. Three weeks last Saturday the water in the lake was lower than it was all this summer and last summer. Of course that would partially arise by our shutting the filtered water out—it was then down to 2 feet 11½ inches.

1091. Have you any absolute and direct communication with the river?—No pipe communication; the ditch may be called a direct communication, because it rises and falls with the water in the river.

1092. (*Mr. Harrison.*) But the supply to the ditch is above Oxford?—Yes, it is from Ferry Hincksey.

1093. (*Chairman.*) Have you ever gauged how high the water would rise between night and morning after you had ceased pumping?—That entirely depends upon the height for the time being; ordinarily it would probably run in 1½ or 2 inches, but when the water was at a higher level there would not be the same head of water, and it would not run in more than an inch.

1094. Have you ever known it run in 3 inches between night and morning?—Last summer a stream was cleaned out at Ferry Hincksey so as to allow water to pass round to the mouth of our ditch from two sources. In the course of 24 hours our water, I think, rose on one occasion about 3 inches; but that rise was also partly occasioned by mills below being shut off. If Mr. Towle shuts off his mill the water rises considerably in the ditch, not only on flash days but at other times; and from 12 o'clock on Saturday till he starts on Monday morning we have a good head of water from Mr. Towle's stream.

1095. When you speak of the water rising it is always as a filtration through the subsoil?—Yes.

1096. (*Mr. Harrison.*) Is not that rise so small in a number of hours that the communication between the river and your reservoir cannot be very direct?—Just so.

The witness withdrew.

Mr. W. Underhill.
Mr. H. Underhill.

Mr. WILLIAM UNDERHILL and Mr. HENRY UNDERHILL examined.

1097. (*Chairman.*) In what business are you engaged?—(*Mr. William Underhill.*) We are wholesale grocers and cheese factors.

1098. What do you wish to speak to in this matter?—To show that if we could get a steam navigation on the Thames that there could be a river traffic established between Oxford and London.

1099. In your business transactions have you reason for using the Thames as well as the railways for the conveyance of goods?—(*Mr. Henry Underhill.*) We used to have nearly all our goods by river at one time when the navigation was open from London, but since the railway has been opened the trade on the river has been discontinued.

1100. Had you any experience of the navigation above Oxford?—No, there has never been any traffic above Oxford in our line of business.

1101. What length of time have you been in business and using either the railway or the Thames?—55 years; the business was established in 1810, I think?

1102. What class of boats brought goods up from London to Oxford at that time?—They were rather bigger boats than canal boats; they were common tugboats, tugged by horses, holding from 30 to 50 tons of goods.

1103. With about 15 feet beam?—I should say they were.

1104. What weight of goods did you at any time carry by the river for your own purposes?—I do not know, it is a long time ago; but I should think that we could now do from 400 to 500 tons a year from London.

1105. Do you know what carriage from London costs you per ton by railway?—It averages about 1*l.* a ton; it used to be about 17*s.* 6*d.* upon the river.

1106. Would you prefer river navigation or railway, if you had the choice?—For small goods and light goods we should prefer the railway, but for most of the heavy goods we should prefer the river, if the transit was tolerably expeditious, for such goods as butter and cheese. (*Mr. William Underhill.*) Bacon and cheese and that kind of things we buy on the Thames; we have nearly half at Fenning's wharf or Humphery's wharf; it is the same with chemicals, they go upon the barge and are carried right up the river.

1107. Have you formed any idea as to whether it would be advisable to restore the navigation of the Thames, so as to come into competition with the railway, or not?—I am very strongly in favour of restoring the navigation; the railway accommodation is now decidedly bad.

1108. Trade is a matter of money; if the railway lowered its rates below those of the river you would have your goods in the cheapest way?—I expect so.

1109. So that the present price of carriage would form no standard of test as to the future price if competition came into play. I mean that if persons undertook improvements upon the river, with the idea that they would get the carriage at 17*s.* 6*d.* a ton when the railway company was charging 1*l.*, their hopes might prove fallacious if the railway company dropped its rate to 10*s.*?—I think that the railway company is almost sure to drop its rates. (*Mr. William Underhill.*) At present there is a combination between the Great Western Company, the London and North-Western Company, and the Canal Company to charge the same rates throughout. About three years ago I bought 100 tons of soda in

OXFORD.

Mr. W. Underhill.
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London and shipped it by canal. I wanted to leave a boatload of it at Banbury, and I could not do so unless I paid an advance of 5*s.* a ton. It had to stop at Banbury and come back to Oxford, and I got it from Banbury at 2*s.* 6*d.* a ton, and the railway company charged the same.

1110. Do the railway company deliver goods at 1*l.* a ton, or must you pay extra for carting at both ends?—(*Mr. Henry Underhill.*) That includes the cartage. For instance, we carry soda for 16*s.* 8*d.* the gross weight per ton, bacon and butter are 20*s.*, tea and coffee and that sort of things are 25*s.*, and the small goods are 28*s.*; upon the average it is about 1*l.* a ton. I think that the railway companies pay 5*s.* a ton to the London carters and 2*s.* 6*d.* to the carters in Oxford, and they only allow us 1*s.* 6*d.* a ton.

1111. Have steamboats been used upon the river to your knowledge?—They use them between London and Reading, but not higher up.

1112. Would you anticipate a considerable reduction in the rates of conveyance upon the Thames if steamboats were introduced?—If the old lock rights were done away with, I think that they then could carry by river at about 10*s.* or 12*s.* a ton. (*Mr. Henry Underhill.*) There is a great deal of local traffic between the towns. (*Mr. William Underhill.*) Mr. Glanville, of Sandford mill, pays 1300*l.* a year to the Great Western Company for goods which he would have by the river.

1113. That would represent a capital of 26,000*l.*, taking 5 per cent.?—Yes.

1114. What amount do you think you would pay for carriage if the Thames was in a fit state?—It very much depends upon the state of the markets; we get about 300 tons of soda a year; this year we have it from Birmingham, and in another year we might have it from London. I think that we should be customers to the extent of 400*l.* or 500*l.* a year if the Thames was in a fit state.

1115. Could you navigate the Thames without dredging?—(*Mr. William Underhill.*) We are obliged to dredge between Sandford and Abingdon, the river is almost blocked up.

1116. Then some expense would have to be incurred in putting the Thames into a navigable condition, plus the repair of the locks and weirs?—Undoubtedly; it could not be navigated in its present condition.

1117. Did not the railway company begin by fixing their fares at about 15*s.* a ton?—The fares were much less than that when they first began; they gave us a mileage rate from London of 6*s.* 8*d.* a ton; we used to get sugar at 12*s.* 8*d.*

1118. Was the effect of that to take the traffic from the Thames?—No doubt. At that time you could reckon upon getting goods by railway in about 24 hours.

1119. You had advantage not only in very diminished cost per ton but also in time?—Yes.

1120. But now that the railway company have obtained their object in getting the traffic upon their railway they have raised their rates to 1*l.*; so that by means of this competition in the long run you have to pay about 2*s.* 6*d.* a ton more for your goods than you had originally?—It was when the London and North-western Railway opened that the rates were raised. People thought that when we had two railways we should have rates cheaper, but the two companies agreed to raise the rates all round when they opened.

1121. Then that appears to be an argument for resuming the traffic upon the navigation as soon as possible?—(*Mr. William Underhill.*) Undoubtedly. We should propose getting up a company of Reading and Oxford men to keep the thing in our own hands.

1122. It would then be your interest to maintain your own property in the river, whatever the railways did?—Yes.

1123. Do you think such a company could be got up?—Yes.

1124. As Thames Commissioners, you have had some experience of the working of the commission in its present state; do you consider it an efficient mode or otherwise?—Very inefficient.

1125. From what cause?—It is nobody's business in particular to look after the river. I suppose there are some hundreds of persons in Oxford who might qualify as Commissioners, and whenever there is a meeting the clerk has to go round to get the right number present to elect members to represent the board at district meetings.

1126. Then the clerk has not only to summon members but to drum them up?—Yes, to ask them to come up for a few minutes to make a legal meeting.

1127. How many form a legal meeting?—Seven.

1128. If the gentlemen now forming the commission had the power of voting for an actual working committee, in whom all power would vest for the time being, do you think that that would form a better working board?—I do not think that it would work well.

1129. Why?—I think that the body ought to be a paid body.

1130. Suppose that they were a paid body?—I do not think that there is any probability of the present commission in any way working, unless they get powers to raise money.

1131. Suppose that Parliament gave them power to raise money and to appoint a practical working commission, and to pay that commission?—I do not think that it would work well.

1132. Have you formed any idea as to the means by which you could manage the Thames?—Only by a company and by going to Parliament for powers to pay up the bondholders at the present value of the bonds, and of course obtaining the rights of the navigation of the Thames.

1133. Do you contemplate that such a company could restore the navigation and work it without coming into collision with other interests, the interests of riparian proprietors, of owners of mills, and owners of fisheries?—It would be to the interest of mill owners to join a navigation company, but I do not think that the navigation company would interfere with the fishing.

1134. Suppose that any individual mill owner would not so join?—He might make an obstruction and a very serious obstruction.

1135. Then, again, there are the owners of river frontages, such gentlemen as Mr. Harcourt; do you think that they would not like to have a voice in any power which had the privilege of navigating the Thames past their property?—Anybody has the power of navigating the Thames now.

The witnesses withdrew.

Mr. JOHN DRAKE examined.

Mr. J. Drake.

1136. (*Chairman.*) What are you?—A carpenter and foreman upon the navigation.

1137. Are you engaged under the Thames Commissioners?—Yes.

1138. How long have you been engaged upon the Thames?—About 59 years. I was 14 years of age en I first came there.

1139. Upon what portion of the Thames have you been principally engaged?—From Bell weir to Oxford.

1140. Have you been engaged above Oxford at all?—Never above Oxford.

1141. Is there any other foreman engaged upon the Thames above Oxford?—There used to be one.

1142. What number of men have you had at any one time placed under your charge engaged upon the works of the navigation?—Forty-five men. They built Ray mill pound.

1143. What were they?—Carpenters, labourers, and stonemasons.

1144. Have you within those 59 years entirely rebuilt any of the locks?—Yes. When a boy I was at Culham pound, and I was at Clifton pound; I had the

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management altogether. I had the management of Ray mill pound and then Cookham.

1145. Were they new pounds or old pounds repaired?—They were quite new pounds.

1146. Have you had any other?—Chamber pound and lock.

1147. In what condition are those pounds now as regards repair?—I believe that Ray mill pound is pretty good, because that is a stone pound. Cookham pound is in very bad repair—it is stone at the upper end, all the rest is timber.

1148. Did you build Sandford lock?—Yes.

1149. About how long since?— About 28 years ago.

1150. Was there a lock there previously?—Yes.

1151. Had it worn out or blown up, or what?—The sill was too high—boats could not get over it.

1152. And you made a new one with a lower sill?—Yes.

1153. Both sills lower?—Yes.

1154. What depth of water have you in ordinary seasons upon the sill of Sandford lock?—We have 5 feet on the upper sill and 6 feet on the lower one.

1155. Is that a stone lock?—There is stone at each end of it and timber in the middle.

1156. What is the bottom of the lock?—It is sheeted over with timber.

1157. Are side walls built upon cross timbers and then sheeted over?—Yes.

1158. Do you know what the ground is underneath the foundation?—It is a good loamy foundation.

1159. Had you any difficulty in forming that foundation?—None at all.

1160. From your general knowledge of the Thames and of these pounds do you consider that the foundations of the whole of them are good, or otherwise?—Culham pound is in a very bad state.

1161. Is the foundation bad, or simply the work?—There have been several blows—the water gets underneath the sill and washes the ground underneath at the lower end.

1162. If you had to build a new work could you, from your knowledge, say that a good and safe work could be built there if proper care was taken?—Yes, I have no doubt of it.

1163. (*Mr. Harrison.*) Culham lock is excavated out of the clay?—Yes.

1164. (*Chairman.*) Then the blows which have taken place have arisen from neglecting the repairs?—Yes. The water got through the sheeting and that caused the blows, and the clay there is not good; it will form into a mud by water washing upon it—it will melt and wash away.

1165. When the Sandford lock was repaired did you preserve all the levels the same as they existed previously—I mean the levels of the weir and the lock sills?—We had nothing to do with fixing the level of the lock sill; we took it from that of the old pound

1166. Did you alter the weir at all?—Not at all.

1167. Do you remember the amount of traffic which you had upon the river when you first went to it?—Yes; we had traffic upon the river then up to the time that the railway was made to Steventon, and then it dropped off.

1168. Did that traffic take place night and day?—Yes; we had a great deal of traffic by night as well as by day.

1169. Do you remember any period when you had too little water for the traffic before railways were made?—Yes, certainly.

1170. Do you remember any particular years?—No. Before Day's lock was put in I remember that the boats used to be stopped a good deal on Clifton ferry and below Culham pound. The commissioners had the lock put in at Clifton to help the boats, and after that there was no difficulty in the boats getting over Clifton ferry.

1171. In those periods did the commissioners employ men to scoop or cleanse the river by dredging the bottom or cutting the weeds?—The river was ballasted.

1172. Did you cut any weeds?—No.

1173. Were there any weeds to cut?—There were weeds, but we encouraged the weeds.

1174. Did you take out gravel or mud?—Gravel or sand, but very seldom mud.

1175. Did you do that to deepen the river, or simply because you wanted to use the gravel or sand?—To deepen the river.

1176. What did you do with the gravel or sand?—We used to put the gravel upon the tow-paths, but the sand we used, by leave of the gentlemen living upon the banks, to throw into the river at the edge.

1177. Has the tow-path in your recollection ever been carried away by a flood?—Yes, I have seen it all washed away above Shillingford in several places.

1178. Then the towing horses towed upon the grass land?—Yes.

1179. Did the Commissioners at once order a new towing-path to be ballasted or formed?—In the case I have been speaking of above Sandford we brought flake hurdles and stakes and drove them in where the tow-path had been washed away, and then from the land side we threw in ballast and filled up the space so as to get another tow-path.

1180. You having charge of the work, have you at any time tried to prevent people who did not belong to the navigation from passing along those tow-paths, either riding, or driving, or walking?—No, I was never authorized to do that. We always considered the tow-path as private property.

1181. Had you gates which were locked upon any parts of the towing-path?—There were some at Oxford.

1182. And you kept them locked?—Men were appointed to do so.

1183. At Shillingford, when the towing-path has been washed away, have you moved the gates into the land and formed a new towing-path?—We have moved one gate back three times, and another gate twice, and another once. I have known the flood wash away an acre at that spot.

1184. How many yards wide was the wash?—Fifteen yards inwards, and the ground has accumulated on the other side of the river.

1185. For what length would that wash take place?—It was not more than 200 yards.

1186. At what part of the river did that occur?—Between Day's lock and Benson.

1187. Had you to ask the owner of that land for leave to remove the gates?—No.

1188. Did the owner make any objection?—Not to me. One of the gentlemen belonging to the meadow where we removed the gates back three times was with me, and he made the observation how he was losing ground and how on the other side they were gaining.

1189. I suppose that he did not consider that you could help that?—No.

1190. Do you think that you could have protected that land?—Yes, by laying chalk rubble in at the foot of the bank.

1191. Did the Commissioners order you in any case to use chalk rubble for that purpose?—Never, except where the land belonged to themselves.

1192. And you did so and it stopped the wash?—Yes.

1193. And you think that you could have stopped the wash in other places by using the same means?—Quite so.

1194. Is Shillingford especially liable to flood washings?—Yes, because it is so very crooked, and wherever the river is crooked there is sure to be a wash on one side or the other.

1195. Have you ever had instructions to remove any of those islands or islets in the centre of the river?—No, except as to ballasting the channel.

1196. When you have been ballasting the channel have you ever dug away any of them?—Never.

1197. Do those places belong to landowners, or do the river Commissioners claim any right over them?—The people belonging to the land claim them.

1198. Are they planted with osiers or otherwise used?—Yes, some are planted with osiers. For instance, there is one below Benson pound, and the miller there has planted osiers.

1199. Has that accumulated since you knew the river or was it always there?—There was a little formerly, but it has accumulated.

1200. Are those places stationary or do they move down the river?—The upper part remains still, accumulation goes on at the bottom part.

1201. When the encroachment was made in the bank of the river at Shillingford, what became of the material which was washed away; did it form a hill below?—Yes, it formed a hill below on the opposite side.

1202. But not in the channel of the river, so as to impede the navigation at all?—No.

1203. You know the means at Sandford lock for passing away the floods?—Yes.

1204. Have you known any alteration made in the top of the tumbling bay by the tow-path at any time?—I have no recollection of any.

1205. The bay continues now as it was very many years ago?—Yes.

1206. Have the means of letting off the water at Sandford lock been increased of late years?—The waterway is larger but posts have been put up in the middle.

1207. The posts have decreased the means of passing the water?—They certainly block the water back; formerly at that lock at Sandford all the tackle used to draw out, Mr. Swann made some alteration and put some posts, and they stand there and of course stop the water.

1208. Did he widen the space at all?—No.

1209. And the obstruction of the posts is not to be measured by their size, because they affect the water on each side of them?—Yes.

1210. Have you made any observations at Sandford lock? What difference is there in the level of the water above Sandford lock and below the lock?—There is too much head there in flood time, there wants more waterway. I think that there are at least three feet of fall there in flood time.

1211. Is that in ordinary flood?—Yes, if the flood was higher the fall would not be so much.

1212. In 1852 there was a great flood?—There was not so much fall then.

1213. What is the cause?—The high water gets upon the meadows, and there is the less fall upon the lock.

1214. Who put the word "high" on the water-mark at Sandford lock?—I think a person of the name of Burrish.

1215. By whose instructions?—By the Commissioners.

1216. When was it?—Years ago; he has been dead I should think 20 years.

1217. Is it now in the same position as it was when he put it?—I cannot say.

1219. When there was a great deal of traffic upon the river, before the railway competition, was there more water used for flashes than there is now?—Yes, a great deal more.

1220. Was all that water or a great part of it wasted to the millers?—Yes; the bargemen used always to draw all the water out for a flash, but of late years they draw it very little indeed, hardly enough to send boats along.

1221. (*Mr. Harrison.*) Those locks which you have mentioned as having built were all new locks; there had been no locks before where they were built?—At Sandford there was a pound on the other side of the water which boats used to pass through, but it was very much out of repair.

1222. Bolter's lock was a new lock, in place of an old one which was out of repair?—Yes.

1223. At other places were they entirely new locks?—At Cookham it was a new pound lock.

1224. (*Chairman.*) Do you know how much the Sandford lasher has been raised?—I do not think that it has been raised since I recollect.

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1225. Do you think that any lighter could shoot the lasher now?—No; it was not the lasher they used to shoot, but the pen lock, which is a different thing.

1226. Do you know what is the cost of a pair of your lock gates new, with clows and racks and all complete?—It depends upon how the gates are.

1227. Give me one lock?—At Culham I think that the lower gates are about 16 feet, and at the other side about 10 feet 6.

1228. What would they cost new; are they made of English oak?—Yes, I should think that the two pairs of gates would cost about 80*l.*

1229. How long with fair wear and tear would those gates last?—The frame would stand on plankings; there are gates now upon the navigation which have been in upwards of 40 years.

1230. I suppose that it is the duty of the lock gate keeper to exercise control over boatmen opening and shutting those gates?—Yes.

1231. Do you find that they are very apt to abuse the gates by letting the clows go down with a rush?—Yes.

1232. And they smash the racks and the pinions and the clows and get them out of order?—Yes. I have known a boat come in at that rate that it went bump against the gates, and I have known the bargemen in shutting the gates let them go clap together.

1233. That knocks the gates to pieces?—More harm will be done in one boat passing the lock than in the fair wear of six months.

1234. (*Mr. Harrison.*) Let me draw your attention to Caversham lock at Reading. Do you know it well?—Yes.

1235. To whom does the weir belong?—To the mill.

1236. Has the miller to keep it in repair?—Yes.

1237. Do you remember that, at a short distance below the weir and the lock, there is a shallow formed in the river?—Yes.

1238. How is that shallow or hill formed?—When we repaired that lock we had a stoppage for a fortnight, that is perhaps 30 years ago. That hill was about 150 or 200 yards below the pound. Mr. Treacher was general surveyor at the time; he said, "We will lower the lower sill 18 inches and the "upper sill 12 inches." When the sill was lowered 18 inches he set the men to work to take the hill away, and the result was he found he had deepened the water 12 inches at the pound and no more.

1239. So that the lowering the lock sill was of slight advantage?—Just so.

1240. Is not that hill occasionally a great obstruction to the navigation?—Very great.

1241. The barges strand upon it?—Yes.

1242. And do the boatmen then call upon the millowner to let the water off?—Yes, and sometimes he will do it and sometimes he will not.

1243. How long have you known a barge stranded upon that hill?—From one flash to the other; a flash comes down there on Wednesday and a barge may stay there till the next flash Saturday.

1244. Have you ever known barges stopped in the lock and not able to get out?—No, not after the sill was lowered.

1245. Were they before?—Yes, because there was more water over the hill than there was over the lock sill before it was lowered.

1246. That bank is formed, I think, by the weir chiefly?—Yes.

1247. But still that bank is a benefit to the navigation in its present condition, although at times the barges may stick upon it. In fact the barges could not get out of the lock if it were not for that bank?—Yes.

1248. Do you know the reach below it past the Kennet and down to Sonning?—Yes.

1249. It is deep water in almost the whole of the reach excepting this part immediately below the lock?—Yes, except what is called Caversham hill.

1250. And that Caversham hill is a kind of barrier to that part of the navigation?—Yes.

1251. (*Chairman.*) Did you know Sandford mill

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before the wheel was altered from an under-shot to a breast-wheel ?—Yes.

1252. When was that ?—During Mr. Swann's time, not many years ago.

1253. Has that alteration had any effect at all upon the navigation ?—I do not know that it has.

1254. Would you prefer that the wheels should be worked by under-shot or by breast. Have you any flushing power more one way than another ?—The ground-shot wastes more water than the breast-shot.

1255. Do you know the fall at Sandford ?—In flash time there is more fall than at any other time. I should say that there is 7 feet 6 inches of water there.

1256. Upon the wheel ?—Upon the pound gate.

1257. Is it the highest fall upon the river?—Culham is nearly the same.

1258. And Bolter's is nearly the same ?—Yes.

1259. Supposing that money was found and that the Commissioners decided to put the navigation works into repair, how soon do you think the whole would be done if you had as many men as you could put at each point ?—It is a wonderful work to do. I should say that it would take two years.

1260. And during those two years the river would be unworkable ?—I think that they could manage to work by putting false gates, some temporary gates could be put in. If we got the traffic off all the river it would be a very difficult thing to get it back again.

1261. Do you think that it would be a difficult thing to get the traffic back again now ?—If they could lower their tolls so as to compete with the railway I think that the traffic would come back again, that is my firm opinion.

1262. (*Mr. Harrison.*) Are there any weirs upon the river which you repair for the Commissioners ?—One.

1263. Which ?—Day's weir.

1264. Do not you repair part of Sonning weir ?—Yes.

1265. A part of Sonning weir belongs to the Commissioners and a part to the mill owners ?—Yes.

1266. Are there any other weirs which the Commissioners do anything to ?—Bell weir at Egham belongs to the Commissioners and they keep it in repair, and there is Cookham, which the commissioners keep in repair, belonging to Lord Boston; there are two there which they keep in repair.

1267. Do you know of any other pound locks similarly situated to that at Caversham, where a bank is formed below the pound lock in consequence of the position of the weir ?—It is like that at almost every pound. At Maple Durham it is the same and at Witchurch.

1268. Do the banks in all these cases form an obstacle to the navigation ?—Yes.

1269. Are any of them of such a nature that boats strand upon them ?—Yes ; below Chamber's pound at Wallingford there is a very bad place. A boat loaded with timber went from Oxford and she lay for three or four days before she could get away.

1270. If the weirs as well as the pound locks were under the control of the Commissioners, would it not be desirable for the Commissioners to alter the position of the weirs so as to prevent hills being formed ?—Hills would be sure to form.

1271. In some cases you see that the millers have carried the mill stream for a long distance below the weirs before they use it at their mills ?—Yes.

1272. They thus place their mills below the hills formed by the weirs ?—Yes.

1273. Do not they experience less tailing back of the water in consequence ?—The lower they can get the water below the weir the better they will get it.

1274. In a system of navigation would it not be well that the pound locks should be carried in a similar manner below the weir, so as to get beyond the influence of the weir's tendency to form a bank ?—It wants to be looked after. In some places if you carried the lock down you would save a good deal below, and in another place you would save only a little below.

1275. Are there any of the weirs upon the river where you know of a fall in the water in flood times as great as at Sandford ?—Not one.

1276. (*Chairman.*) Sandford throttles the river more than any other place ?—Yes.

1277. Have you been troubled in the river with refuse washed in from the sewers of the towns more than formerly ?—Yes.

1278. Does that tend to make banks in the river ?—No, I do not think that it does, because when a flood comes it drives away all the little hills.

1279. Have you had any nuisance from gas refuse passing into the river from the towns ?—Yes, particularly from Wallingford.

1280. So as to kill the fish ?—There is no doubt of it. At Wallingford there is as much as two or three inches of gas refuse at the bottom of the water.

1281. There used to be ?—It settles now.

1282. Have you any nuisance from any paper mills ?—Very much from Sandford.

1283. Sandford seems to be a terrible place?—Yes ; when the men were building the new pound, if they were at work anywhere near when the bleach was let off they were obliged to leave, they could not bear the smell.

1284. How was it with the fish ?—It killed all sorts of fish below Sandford.

1285. (*Professor Way.*) How long ago was that ?—Not many years ago.

1286. (*Chairman.*) Are there any other paper mills on the river ?—There is Sutton paper mill about two miles from Abingdon.

1287. Is there any refuse from it ?—Not so much as from Sandford.

1288. But is there any ?—Yes, of course.

1289. And is it a nuisance in the river ?—Yes.

1290. Does it kill fish ?—I never knew it kill any there.

1291. (*Mr. Harrison.*) When the posts were put into the old lock at Sandford did the Oxford people complain ?—I think they did.

1292. Was anything done to compensate for the placing of those posts in that lock so as to free the water in flood time ?—I am not aware whether there was or not.

1293. Do you remember a lock being placed in the mill bank a little above, what they call the compensation lock ?—Yes, some bricks were put in there.

1294. In what condition is that lock now ?—It is all taken away.

1295. The compensation lock no longer exists ?—Just so.

1296. So that any obstruction which is done by the insertion of those posts of which the Oxford people complained still remains ?—Yes.

1297. (*Chairman.*) Some of the locks are entirely of stone, I think ?—Ray mill is all stone.

1298. Has that been constructed since you have been connected with the navigation ?—I took charge of all that work.

1299. Who designed the lock ?—Mr. Treacher.

1300. If you were consulted would you recommend that all the locks should be restored in that manner—I mean that they should be built of solid masonry and not partly of stone partly of timber ?—I think they should be built of solid masonry.

1301. In making your lock gates do you use cast-iron racks ?—Yes.

1302. Did you ever use wrought-iron racks?—Never.

1303. If wrought-iron racks could be made do you think that they would be better than the cast iron ?—There are some racks now on Culham gates which have been there since the gates were made, and they have been made 50 years, all depends upon the metal.

1304. Do you think that founders put in as good metal now as they did 50 years ago ?—No.

1305. Have you had many breakages there of racks in your experience ?—Yes, a good many.

1306. Some racks, I suppose, would not last a week ?—Some break the first time ; if the metal is very brittle the cog breaks out.

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1307. You never saw wrought-iron racks ?—No.

1308. (*Mr. Neate, through the Chairman.*) I think that there has been some little misapprehension with regard to Caversham lock. It would seem from what you stated that whatever good was done by lowering the sill has been counterbalanced by the removal of the island; but I believe that since the lowering of the sill there has been no stoppage in the lock; there has remained a gain of six inches over the sill; so that since that joint operation barges have never hung in Caversham lock ?—(*Witness.*) I have known one block into that lock.

1309. (*Chairman.*) But have they been obliged to block into it since the alteration ?—Yes.

1310 (*Mr. Greswell, through the Chairman.*) Would it not be a very great relief if one of our great winter floods, instead of coming down all at once were made to come gradually, say in six days instead of in six hours ?—I do not see how it could be done.

1311. (*Chairman.*) Never mind how it is to be done; but do you think that if you could regulate the flood so as to let down gradually it would be a greater advantage than if it came down as it does now ?—Certainly. I live at a lock, and if there is a great deal of rain for a day and a night the following day there is a flood, and the question is whether you will keep that water back or draw your tackle; if you did not draw your tackle it would overflow the meadows. You cannot well regulate the flood so as to keep it back two or three days, if it comes hastily it must go hastily.

1312. (*Mr. Greswell, through the Chairman.*) But in Port Meadow you have an absolute lock 550 yards long, and if you availed yourself of it so as to allow only 35 yards of water to pass above Oxford, would not the water be made to come down the river slowly in five or six days, and would not that be an immense advantage, if it were possible ?—It would be very well if you had a good lock which could regulate the water.

The witness withdrew.

Mr. Alderman W. Ward.

Mr. Alderman William Ward further examined.

1313. (*Mr. Harrison.*) Can you state the cost of carriage between Oxford and the Forest of Dean collieries ?—I yesterday mentioned the cost of bringing coal from Gloucester to Oxford to be 7*s.* a ton. I find that the exact charge is 4*s.* 6*d.* a ton for the railway charge and 9*d.* for the trucks, that makes 5*s.* 3*d.* in all.

1314. Is much coal brought from Gloucester by railway ?—It is chiefly anthracite coal, it comes from Tenby and Swansea to Gloucester by the Severn.

1315. I suppose very little of that is used ?—Perhaps about 1,000 tons in this neighbourhood—it is used for malting purposes, there are considerable malt operations.

1316. Used that coal to come by the Stroud navigation ?—Yes, and it comes up the Severn from Swansea and thence by the Gloucester and Berkeley canal, and up the Stroud water to Lechlade, and so to Oxford. Sometimes it comes from Bristol. I yesterday mentioned that from Lechlade to Stroud I thought the distance was only 16 miles, but I find that it is exactly 30 miles by the canal, and Stonehouse is about four miles beyond; from Stroud to Oxford it would be 75 or 76 miles.

1317. Then from Stroud to the Berkeley canal is how much ?—About seven miles.

1318. So that from the Berkeley canal to Oxford it will be about 83 miles ;—Yes, and the total distance from the main where we get our coals from to Oxford is about 90 miles.

1319. Have you any idea of the quantity of coals which used to be brought from the Forest of Dean to Oxford ?—Yes, there used to be between 3,000 and 4,000 tons a year.

1320. And now that is reduced to nothing ?—Yes, to about 100 tons, or probably 200 tons.

1321. You are the chairman of the Local Board of Health ?—Yes, I have been so since it was formed in November.

1322. And you have a plan proposed for the sewerage of the city of Oxford ?—Yes.

1323. One of your outfalls is below Sandford mill ?—Yes, and one or two more have been shown to Mr. Bazalgette.

1324. Is it proposed by the Local Board of Health to distribute the sewage of Oxford upon the land and to utilize it ?—That is one of the things which we have put to Mr. Bazalgette, and my opinion is that we must do so. I think that no other plan is feasible or ought to be adopted.

1325. Have the Local Board of Health taken any steps to ascertain whether they can obtain land?—Merely by conversation with Sir George Bowyer, who is the sole proprietor of all the land we should require to take if the outlet is at Sandford.

1326. Is he willing to let you have the land ?—Upon a consideration, of course.

1327. Have you taken any steps to ascertain how far the application of sewage to land has been found beneficial ?—The commissioners have been to Lord Essex and have seen his works at Watford; that is the only place which I myself have seen where it has been applied, and the effect upon the land of Lord Essex is wonderful, although the distribution is I believe carried out in a very expensive way. Our surveyor has been to Carlisle and to Edinburgh and to Rugby and other places.

1328. Are you aware that at Croydon they utilize the sewage to advantage ?—Yes, I have so understood.

1329. And that the authorities there, the local board, receive a certain sum for the use of it ?—I have understood so, and my experience from what I have seen of it is that we can do the very same thing at Sandford, because we have arable land on to which it could be pumped, and also grass land where it could be distributed. According to what I have seen it is of no use putting sewage on where there is flood water.

1330. In your opinion would it be a proper course for Government to oblige towns to apply the sewage to the land and not to leave it to their discretion ?—Quite so, and to oblige landowners to sell land for the purpose.

1331. To sell land to the Local Board upon a fair compensation ?—Yes.

1332. (*Professor Way.*) Do you think that that would be fair ?—Yes, Sir George Bowyer has himself hinted that his land is building land and not agricultural land, which would of course have a more limited value. I think that all local boards should have power to take what land they want for sewage purposes, making a fair compensation to the owners of the property.

1333. (*Mr. Harrison.*) You are aware that the Government authorizes railway companies to purchase land for the construction of works and for their stations, and so forth ?—Yes.

1334. Considering that it is for the public benefit ?—Yes.

1335. Do you think that a similar power should be granted to local boards of health for the distribution of their sewage?—Yes; but it is rather doubtful whether under the present Acts we are empowered compulsorily to take lands for the purposes of distribution of sewage.

1336. You think that authority should be granted actually to purchase the land ?—Yes.

1337. Do you not think that there would be great opposition to that on the part of landowners ?—There might be; but if the Government compels us to use the sewage, how can we use it unless we get land to use it on ?

1338. Are you aware that at Croydon the authorities have made up their minds, in case they find a difficulty in getting a further lease of the land to which they now send their sewage by gravitation, to

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put up pumping machinery, and to pump their water to a higher level where they can obtain land at a reasonable rate?—I think that that would be the case at Sandford; it is a very narrow valley below Sandford, and I doubt whether we could put all the sewage over the meadow land; but I think that we might pump it on to the higher land, that is arable land.

1339. (*Professor Way.*) As to the outlet at Sandford, I suppose from what you have stated that you doubt the land in the immediate neighbourhood of Sandford being available for sewage application?—There is a very large field, but I doubt whether it is not subject to floods.

1340. Has Sandford been selected for the outlet with reference to the application of sewage, or simply as part of the old plan in which the application of the sewage was not contemplated?—I do not think that Sir William Cubitt's plan contemplated distributing the sewage, but latterly we have been looking at it with that idea. We propose the outlet to be at Sandford for two reasons—first, for the outfall, and secondly, because there is plenty of land in the neighbourhood to utilize the sewage, more than anywhere else.

1341. Do you think it necessary that land intended for the application of sewage should be immediately contiguous to the river, provided that it is of a tolerably porous nature?—There can be no necessity for it being close to the river, but our fall happens to be there.

1342. If you found land more suitable for the application of sewage than you could get at Sandford, would you not divert your sewage in the first instance to that land, instead of carrying it first to Sandford and subsequently pumping it up again?—Yes, if we could find such land in the immediate neighbourhood of the city.

1343. And have you reason to believe that there is not that land?—I do not think that we can get any land nearer than Sandford. There will be a great flow of water which must go into the river. The storm water must go somewhere. Perhaps, however, the storm water might be deposited in the river at once, without going down the sewers; that is a question of expense.

1344. I think that one of the witnesses mentioned that tanks were to be made, and he said that Sandford was chosen merely as a place for the collection of the silt and heavy particles?—For the precipitation, I suppose. It is a question I think not yet solved, whether or not to distribute all the sewage together withou precipitation. Some people think that it might be precipitated and that you might sell the solid matter.

1345. You have not yet quite decided whether you will deal with the sewage by precipitation or by application to the land?—No, we are waiting for further consideration upon the matter.

1346. (*Chairman.*) Are you a Thames Commissioner?—Yes, in virtue of the property I hold I was elected.

1347. You were elected and served upon one of the committees?—Yes, I was elected for the sixth district.

1348. Have you attended any of the meetings of the Committee?—Not more than two or three. I think I was only on one year.

1349. What number of members attended?—From 12 to 14 I think.

1350. Do you think it would be advisable to reconstitute the commission if anything is to be done with the Thames?—It is very necessary to have quite a different committee. Different persons I think ought to be elected.

1351. Would it be advisable to restrict the present powers of the Commissioners to voting for a working committee and leave the management exclusively to such working committee?—That would be a way of carrying it out. If there was a small working committee it would be no matter how large the body was who elected them. As it is, there is no responsible power in the commission.

1352. Have you ever considered, as a Commissioner attending these committees, that you made yourself responsible for any works that you ordered, if the funds of the committee fell short?—Yes. I was present at a meeting that was held when a legal opinion was read to that effect.

1353. Had that a very encouraging effect upon the committee?—It had a very discouraging effect at that meeting. I moved that in order to keep the locks in order, and prevent them from going to rack and ruin, applications for funds should be made to the Oxford Canal Company as having an interest in the navigation, and also to coal owners who had an interest in the trade.

1354. Are you a bondholder?—No, I am thankful to say I never was. I should not like to give 1*l.* for a bond of 100*l.*

1355. Are you a member of the committee now? —No.

1356. Your time has elapsed?—Yes; they only elect for the committee every year.

1357. If it was proposed to elect you on this committee again, would you serve as the commission now exists?—I think I should decline being on the committee, for I see no use in being upon it; it would do no good.

1358. Have you any further observations to offer? —With respect to the navigation being restored, I think that flashes should be done away with as much as possible; but in that case low-water mark ought to be raised considerably, so as to keep the water up to a certain extent. It is this want of water which the navigation fails so much in. For example, boat down to Abingdon or to Sandford, and if we cannot get the water, of course we can take nothing down; but if there was a certain quantity of water, if we passed only 15 or 16 tons down, it would be better to bring the boat up to Oxford to take it down to Abingdon. They are obliged to wait here, and if a boat is loaded for a great quantity of water, that is not to be had in summer time without waiting three or four days, then they get this here. We fetch it about seven miles from Oxford. They have to go and shut all the tackle in and get the water, and to pay a man for drawing it up and to bring it down to Oxford. Then the boat goes with that water, and after all that water is wasted by two millers. These millers find the water coming down, and the moment it gets to the mills they begin pulling away as hard as they can. They work all night and draw the whole reach empty. The boat goes on with that water, and a man is sent forward to Sandford lock. But see what a quantity it requires to take this one boat down! I have heard the millers say that, if there was water, they should not object to having the low-water mark raised, and then you would have a kind of canal navigation when the water is very low.

1359. Do you not think that if you raise the low-water-mark by raising your weir, nature would soon counteract you by raising the bed of the river with silt?—I think not.

1360. Would it not be necessary to dredge to maintain the pools at an equal depth?—Why I mentioned low-water mark was that the millers should not draw all the water out.

1361. (*Professor Way.*) It has been stated in evidence as the opinion of one gentleman, I believe, that it would be desirable to divide the river from Staines to Lechlade into two jurisdictions, one to embrace that portion of it between Oxford and Lechlade, and the other from Oxford to Staines. Are you of opinion that it is desirable to have two such boards?—Whatever commission you have from Staines to Oxford should, I think, have some power over the river from Oxford to Lechlade, because the supply of water comes from there.

1362. Therefore you think it would be much better to vest in one board the whole extent from Staines to Lechlade?—I see no object in having more than one board; there is very little to manage up above.

1363. (*Mr. Harrison.*) You say that you have been in the habit of purchasing flashes of water, but what right have the persons to demand anything for that water?—It is a question whether they have a right

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or not, but they do demand money for it. They keep up the place, I suppose, for fishing, and you can go there and purchase water.

1364. What right do you consider you have over that water when you have purchased it?—At all events we bring the water down with us, and we can make the millers draw for so many hours. When I take my boat down to Iffley lock, I say to the miller, "You must draw that water," and if he does not continue to draw it for so many hours he is liable to a penalty.

1365. That is with regard to the regular flashes?—Yes. At Oxford we start on Tuesdays and Fridays. We cannot get down without a flash. We generally give a few shillings to have it drawn for us; it is done; but if the matter was properly looked into, I think it would not be allowed.

1366. Can you blame millers for trying to utilize as much as they can the water that comes down, and to anticipate those flashes by drawing down?—No. They do so of course for their mills, and I do not blame them for doing it; but there ought to be some regulation. It should not be open to them to do it as they liked. The system is bad for the millers and for the navigation.

1367. (*Chairman.*) Who are the persons who sell this water, and into what fund does the money go—does it go into any fund belonging to the Commissioners?—Not at all. I think it goes into the pockets of the persons having the command of the weirs.

1368. Who are those persons?—I think they are under the Navigation Commissioners. I am told that the people who rent the weirs are bound to send the flashes down on certain days, but they do not do it unless the bargemen go up and buy the water.

1369. Of what head of water would a flash consist, and what extra depth would it give you?—A boat draws about four feet. Now, say that on Monday we should have a foot of water in the river, on Tuesday morning, when the flash comes down, there would be five feet, so we should gain four feet by the flash.

1370. I observe that you gave evidence before the Select Committee of the House of Commons to the effect that you thought the Oxford Canal Company and the coal owners might fairly be asked to contribute towards the construction of navigation works, and on public grounds you thought that the Government ought to assist, are you of that opinion now?—Yes.

1371. In what shape would you ask the Government to assist?—If we could not get a loan for want of persons responsible for the interest, I think Government ought to give a donation of money.

1372. To the river Thames?—Yes.

1373. Would not the Chancellor of the Exchequer have to encounter a great many applications of a similar kind from other parts of the empire for gifts of money?—Yes, and I think the Government should give in all cases of public rivers; they did so to a great extent in Ireland, on the river Shannon, and that money was all pretty well thrown away, for there is very little navigation there. I think that on public grounds Government help ought to be given; the maintaining of the river is for the public health, and particularly in the case of the Thames, seeing that it is the source of the London water supply—the public interest is plain there.

1374. The water supply of London unfortunately is in the hands of private companies, and the maintenance of the river would be for the benefit of persons who had a pocket interest in supplying the water?—Yes, but still the health of the metropolis is a great thing. If this navigation is swept away and the locks are ruined, the water will flow all over the country, it would not confine itself to its present bed.

1375. As every inch of ground in the Thames Valley is owned by some one, do you not think that the land might fairly be assessed for the works necessary to improve the river, which are works for the benefit of the whole valley?—Yes. I think that a drainage commission who would make the whole valley of the Thames much better might impose a compulsory payment per acre, and the landowners should be compelled to make proper outlets and inlets for the water.

1376. Would you not, as an individual owner, feel more satisfied to have contributed your proper proportion to the maintenance of the river, than be pointed at as having received Government money as a charitable gift?—Yes, but I think that the matter is complex, the navigation as well as the land is interested.

1377. If a navigation is established it is established for some beneficial trade purpose, some persons are supposed to have interest in it?—The towns would, of course.

1378. The towns, and persons trading on the river, and persons owning property on both sides of it; do you not think that all those classes should be compelled to contribute their fair share towards the necessary expenses of the navigation?—Yes, I think so.

1379. Would not that preclude the necessity for a gift from the Government?—Yes. It seems to me to be a most equitable arrangement that all parties participating in the benefit should pay for it.

1380. (*Mr. Harrison.*) The Thames is the Queen's highway?—Yes.

1381. Does it not appear to you desirable that some provision should be made to ensure the maintenance of the water highways similar to that sanctioned by Parliament in respect of highways on land, for the benefit of the public?—That is my opinion. It is proper that we should have highways kept up both upon rivers and upon land.

The witness withdrew.

Mr. John Drake further examined.

Mr. J. Drake.

1382. (*Chairman.*) I believe you have some proposal to make with regard to Sandford lock and the lashers, will you just state what it is?—First of all I should recommend the high-water mark to be lowered four inches and a lasher to be made 150 feet wide, the sill of the lasher to be lowered so as to be 18 inches under high-water mark, and then some woodwork to be placed at the top of the sill to raise it up level with high-water mark, the woodwork to be such that it could be moved in a high tide. Lowering the water at Sandford lock would lower the water at Iffley, and that again would lower the water at Oxford.

1383. (*Mr. Harrison.*) Are there any lashers at any of the pound locks that pass the whole of the water without weirs?—No.

1384. What extent of weir is there at Sunning?—There is a good deal of weir there, but they have got a box and a lock to draw.

1385. Do you think that if lashers were made sufficiently long at each pound lock you could pass the water over lashers without weirs?—No, there must be weirs to admit the flood water over. When I was appointed to go to Day's lock the locks were very narrow, and Mr. Treacher agreed with me that it would be well to make the locks wider; there are two locks there, and I made one lock seven feet wider and the other I made two feet wider; there is land water there, and there used to be a head of water formerly, say of 18 inches, but by widening the locks I lowered this to 10 inches.

1386. Can the high-water mark be lowered four inches at Sandford without lowering the sill at Iffley pound lock?—Yes, I think I could do that well.

1387. Is the high-water mark the flash mark?—Yes.

1388. Would it be possible to place a weir across the upper part of a mill race, so as to prevent the millers drawing the water out of the pound lower than the low-water mark?—I do not think so.

1389. Why?—Because they would not have a sufficiency of water to work their mills when the water was low in the river if you were to put a dam across there.

The witness withdrew.

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GEORGE PARSONS HESTER, Esq., examined.

1390. (*Chairman.*) You are town clerk to the city of Oxford ?—Yes.

1391. How long have you held that appointment ?—26 years. I am also clerk to the Sixth Navigation District of the Thames, but that office is pretty well a sinecure.

1392. Do you receive a large salary for your services ?—Four guineas a year, including all expenses, and I think I am very well paid. As regards the duties of the District Commissioners, as distinguished from those of the General Commissioners, there is no doubt that if there were ample funds, and the District Commissioners were disposed to exercise their privileges, they might take a good deal upon themselves : but thepractice of late years has been, and I think, upon the whole, it has been a wholesome practice, that the General Committee have attended to the work and have ordered the work, and the District Commissioners have in fact not met, except under the direction of the Act of Parliament, to choose three Commissioners at the end of the year, in the month of October.

1393. Which choice, I believe, has recently been exercised ?—Yes, we have appointed our three, and I have been obliged to appoint myself as one, for want of other persons offering themselves. I am not ineligible, but of course as clerk it would be better that some one else should act, but no one else desires to act.

1394. You are now Clerk of the district, Committee man, and Commissioner, all in one ?—Yes, and there is a precedent for it, for some years ago Sir William Taunton, the father of Judge Taunton, acted in the same way.

1395. You are no doubt well acquainted with the condition of the Thames navigation as it at present exists ?—Yes, in my own district, and perhaps about halfway down, or the whole of the fifth district.

1396. What is the present condition of the navigation ?—I should say that it is not at all in a good condition.

1397. Is it in a dangerous condition ?—There is no doubt of it as to the locks, for they are liable to blow up at any time.

1398. Are there any locks situate above Oxford the blowing up of which would injure the suburbs of Oxford ?—There is no doubt that if in a high flood they were to blow up it could not be otherwise than a great injury to Oxford.

1399. Would the suburbs be submerged ?—Yes, very likely St. Ebbe's and St. Thomas', they lie together, and they are in what we call our low district,

1400. Will the legal opinion, which saddles the responsibility upon the members of the committee for all works ordered by any meeting at which they were present, have a beneficial effect upon the working of that committee, or otherwise ?—Quite otherwise; some gentlemen would be timid, and they have come to some resolution not to act. I rather think that they will cease to act, or pretty nearly so; at the same time I think that they cannot keep to their resolution. If we hold meetings and there is work to be done we must do it to the best of our power, but I have never taken a very active part in the proceedings of the committee.

1401. How many of these committee meetings have you attended ?—I seldom go beyond Wallingford. I have been to Reading and I have been to Marlow, but I have not been in the habit of going there, for I have not found myself of much use when I did go there; there were always plenty of gentlemen to conduct the business, and therefore I should, as an Oxford member, very seldom go there.

1402. Were the accounts audited ?—The accounts were very carefully made out, and there was always some one of the Commissioners whose duty it was to look closely into them, and I think we went into the vouchers always. There is no provision for auditing any account, and the Commissioners have nothing for the performance of their duty, although they are taken out of their business.

1403. Have you formed any opinion as to the reconstitution of the Commissioners ?—I think the present system of Commissioners is a very bad one and ought to be wholly altered. If I had any opinion it would be to agree with what Mr. Ayrton said in the House, that the river ought to be managed by the country gentlemen, and that it would lead them to see the great benefit that their lands might receive.

1404. Do you think that you could form a working committee out of the country gentlemen which could deal with the mills, the navigation, and the rights of villages, towns, and cities on the course of the river ?—I see no difficulty in it, if they took with them a reasonable proportion of representatives of the cities and boroughs on the river.

1405. You would have the universities and the city owners of land and the navigation represented ?—Yes.

1406. And the mills ?—No; I do not see what millers have to do with it except as owners of property.

1407. As to the number of the new Commissioners, do you think that the present number of 600 or 700 facilitates the business required to be done, or retards it ?—The business is not done properly by so many persons, and there are perhaps not one-tenth part of them who take any interest in it—indeed I should think not one-twentieth. All they do is to submit to canvassing when there is any voting to be done, and that ought to be quite done away with; the qualification is absurd.

1408. Is not the present constitution of the Commissioners similar to this, that the town council, say, should consist of every man who owned a certain amount of property or paid a certain amount of rate, without any further election ?—That is pretty nearly identical with it.

1409. You can easily imagine, as town clerk, that if you attempted to govern Oxford by such a body, you would probably come to a dead lock such as there is on the river ?—It might be so.

1410. You would have no hope of an efficient government from such a multitude of masters ?—Certainly not.

1411. You have masters enough in the town council what is their number ?—40.

1412. Do you consider that you have enough ?—Yes, quite enough.

1413. You are quite satisfied that the Thames Commissioners, as at present constituted, are an unwieldy body ?—Yes.

1414. And an unworkable body ?—Yes, quite so. I should do away with the system altogether, for it is absurd; I will give you an instance of it. We are directed to advertise the district meeting, and if I were not myself to take the trouble to pack, I may say, a number of gentlemen to come to do the work (and we must have seven), there would not be enough Commissioners to make an election.

1415. If the gentlemen who are *ex officio* members of the commission only had power to vote for individuals who should form a working board, would that answer ?—No; I would rather trust a known body of gentlemen of a certain respectability, such as magistrates of the county, with a mixture from the towns.

1416. The magistrate must have a money qualification in the county ?—Yes, a landed qualification.

1417. But a magistrate for the county might have property miles away from the Thames ?—That would make no difference, he would be a check upon local interests.

1418. But the principle of government in this country is to have no taxation without representation, and it might so happen that the largest riparian proprietors might not be magistrates ?—Yes, that might be so.

1419. Then it might so happen that a magistrate qualified by holding land in the county, but at a distance from the river, would be called upon to legislate for a riparian proprietor, who would be seriously affected both by the amount of money he

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would have to pay and the class of works proposed to be executed, and he would have no voice in the matter?—It might so happen, but he would have some sort of influence over the magistrates who would be his judges, as I may say; and it is a good thing that power should be placed in the hands of independent persons who are above the improper influence of interested persons. Lord Abingdon has got 11 miles of riverboard, and he cannot be induced to take the slightest interest in the matter; he is only a life tenant, and although he is a very able man he will not go into this question.

1420. Do you think that he would be equally apathetic if he thought that other individuals were going to acquire a power over his vast property, and he himself were allowed no voice?—You will not find any instance of such a large proprietor without I should say, being a magistrate, or having a sufficient influence over the magistrates to have justice done to him.

1421. He is a magistrate?—Yes, of course. Sir George Bowyer is not so apathetic, and yet he has never moved at all in the matter; we understand now that he is willing to join.

1422. Do you think that the Commissioners, as now constituted, are not a fair representation of the interests at stake?—I do not think that they are bad representatives of the interests at stake, but being so numerous they are unwieldy; they do not take an interest in the matter, and I do not see how they are to be brought to do so. So large a body is liable to abuse in the way of canvassing; they would be serving friends instead of performing a public duty conscientiously, or not trouble themselves about the matter at all—it is so now.

1423. I suppose that personal feelings influence men in voting almost in every case?—I should say that there is less of that among the class to which county magistrates belong, more particularly when they are before the public and all their proceedings are reported.

1424. Have you ever known such an appointment as the head of the police of a county to be given away?—I only know of one appointment, and that I consider to be a very excellent one, but how it was obtained I do not know.

1425. Is there not very much canvassing when a place of that kind is to be given away?—There always will be canvassing in everything.

1426. (*Mr. Harrison.*) Nevertheless, with all the canvassing, when the magistrates meet to consider the subject do they not endeavour to obtain the best men?—I should say that the majority of them do.

1427. (*Chairman.*) What number of magistrates is there for the county of Oxford?—We have a list of them, and I think there are 100.

1428. (*Professor Way.*) Would you have representatives from the counties of Wilts, Oxford, Berks, and Bucks?—No, I would only take those on the banks of the navigable parts of the river. Wilts is quite out of the question. Gloucester, Berks, and Oxfordshire would be the only counties, and I should say Buckinghamshire, and, as we go down the river, Middlesex and Surrey.

1429. Do you think they would each of them have 100 magistrates?—I should not wonder if they have, but the magistrates for each county can divide their duties and their districts.

1430. (*Chairman.*) Would it be possible to take a map of the Thames, and drawing a line parallel with the course of the river on each side, say at the distance of a mile inland, which would perhaps be as far as any influence of the Thames would extend, thus to carve out an electoral district, excluding the rest of the county?—I should not confine it in that way; I should prefer taking in the whole county, in order to get persons who were quite disinterested and able to exercise a calm judgment free from influence. By the plan you suggest, we should lose, for instance, Mr. Henley, who has always been our mainstay in Oxfordshire—he is an inland proprietor.

1431. If you formed a committee of 200 or 300 would you not be getting into the very same dilemma that you desire to escape from?—The whole body would, of course, appoint sub-committees. There must be such machinery as would work.

1432. As I understand you, the power to elect should reside exclusively in the magistracy?—I think so, merely because they are a known body and easily defined, and because they perform their general duties well.

1433. (*Mr. Harrison.*) The river Thames forms a boundary for a considerable distance between Oxford and Berkshire?—Yes.

1434. How would the magistracies of the two counties concert to manage the Thames?—I cannot say; it is to be managed, but it is not for me to say how, though I do not see any difficulty in the matter.

1435. (*Professor Way.*) You stated that you would add to the representation by selecting people from the towns?—Certainly, the towns ought to be considered.

1436. (*Chairman.*) What would you give to Oxford?—In proportion to the city property.

1437. The mayor of Oxford is a magistrate for the time being?—Yes.

1438. Are any of the heads of colleges magistrates?—Five in a general way—the Vice-Chancellor and four pro vice-chancellors, but it is not their habit to meddle with city affairs; they do not come to our bench.

1439. They are qualified as county magistrates?—The Vice-Chancellor acts as a county magistrate for both Oxford and Berks, and I think the pro vice-chancellors as well.

1440. Would you add from the towns and cities additional members plus their own magistrates?—I do not see any occasion for that.

1441. Do the magistrates form a committee or sub-committee for the management of the lunatic asylum?—Yes.

1442. And also for any county gaol?—There all the magistrates have an equal power—at least that is my impression.

1443. Have not all the magistrates an equal power with regard to the asylum?—No, we elect four magistrates out of perhaps a dozen to manage the asylum.

1444. And you think that the magistracy would be fitting machinery to work for the improvement of the Thames?—Yes, and particularly I think they would be a good body from which to take out a limited working number, and of course that must be come to.

1445. Do you think that the committee should have power to levy rates, to execute works, to appoint officers, to grant leases, and to do all the necessary business connected with the Thames navigation?—Yes, I think it might be very well left to them.

1446. Would it, in your opinion, be advisable or otherwise to ask for a public grant of money for the improvement of the Thames Valley?—I have rather a strong feeling about that. I consider that it is a disgrace to the country that persons who have lent their money upon what may be called public property should have it confiscated as it is done. I am speaking now about the bonds. I think that Parliament should provide for the payment of the bondholders in some way.

1447. Has Parliament incurred that debt?—Yes, because they have sanctioned it by the Act under which this money was borrowed.

1448. Could not that same doctrine be applied to every bankrupt concern that was ever established under an Act of Parliament?—I think there is a considerable distinction. What I am saying would, however, equally apply to turnpike trusts.

1449. (*Mr. Harrison.*) In the case of turnpike roads, is it not the case that the Acts of Parliament limit the security to 21 years, so that persons lending their money upon trust must take the risk of getting repaid within 21 years?—Yes; but you will find that, out of every 100 persons who lend their money, 99 knew nothing of the limitation; they thought that they were putting their money into public securities, as in the funds, only getting a little better interest.

1450. (*Chairman.*) Do you think that the unfortunate proprietors in the Great Western Railway Company have an equal claim upon the state because their company has been constituted by Parliament?—Cer-

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tainly not; that was a speculation, and it was known to be so.

1451. Was not the Thames improvement and navigation also a speculation?—Certainly not, because the bondholders had no interest in the surplus receipts.

1452. (*Professor Way.*) You mean that the commission could get no profits for their own benefit?—Yes, they had nothing to do with profits.

1453. (*Chairman.*) There are railway bondholders or preference shareholders who have lent their money, and who are not entitled to anything whatever but a specified interest—are they not in the same condition as the persons who have lent their money upon the Thames navigation?—No, the railway bondholders knew very well what they were about, all of them.

1454. Do you not think that the persons who lent their money to the Thames navigation knew what they were about?—No, they did not suppose that they could ever lose anything by it.

1455. Ought they not to have known what they were about?—They are not a class of persons likely to know.

1456. You think that the Thames navigation is so exceptional that Parliament might reasonably be asked to wipe off the debt which now exists?—Yes; I would give every present holder of a Thames bond the money that he paid. We could not go back to indemnify those who were bondholders but have ceased to be so, having parted with their shares at an inadequate price; but if a present bondholder gave 10*l.* for a 100*l.* bond, I would give him the 10*l.*, and the original proprietors who are bondholders still should have 100*l.* That I think is the fair way of doing it, and the same way in turnpike trusts. I am, however, no holder of securities on either.

1457. If it were possible for Parliament to entertain the proposition of settling the debt now existing upon the Thames in that way, would you in paying the principal pay also arrears of interest?—I think not, or at all events not more than the interest upon such sum as in each case had been actually paid.

1458. If, then, a man has retained his bond for 20 years, and has received no interest at the ordinary rate of interest, you would double his capital, not paying compound interest but simple interest only?—That would not happen in any case, for we I believe paid up our interest to within a few years, comparatively speaking up to Christmas 1851.

1459. Would you say that in respect of liability to floods the city is in a worse condition now than when you first knew it?—I think not, particularly in the last few fine seasons, but they have been exceptionally dry. We may have a glut of wet, and if we do Oxford will be in a deplorable state, and all the country round.

1460. Do you know the position of Sandford lock?—Very well.

1461. Have you formed any opinion as to the effect of that lock upon the river in floods?—The effect of that lock upon the river is precisely this, that in evil times, as Dr. Buckland has said, it may drown Oxford and all the country above; it is just at the foot of a large flat where there is high ground below, and where all the network of streams unites; that has been a sore place at Oxford, and has been so, as may be seen by the records, for 600 years. Sandford mill was erected by the Knight Templars, and at that time the University of Oxford interfered, and there was some agreement come to as to the way in which the mill rights were to be exercised. There was a great riot and a lawsuit in consequence of the shutting up of the water at Sandford. Unfortunately, Mr. Griffiths, the present very excellent keeper of our archives, cannot find any such agreement in the University archives, but we have a notice of it in Peshall's History of Oxford.

1462. Has there been, during the time you have been town clerk, any proposal on behalf of the city to purchase that mill and its rights?—I believe that I and Alderman Ward are the only parties that would take any interest in the matter. I did what little I could. I had an abstract of the title of Sandford mill for three months in my office, and the city could then have bought it for 5,000*l.*, but we could not move anybody else.

1463. Would it have been a very advantageous purchase for the city of Oxford?—No question about it.

1464. Could it be purchased now?—Yes, perhaps for 20,000*l.* Mr. Norris has laid out a great deal there. I do not know what the present tenant is doing; but it would be a good thing to purchase it, because you would do away with the chance of abuse. I think the mill might stand and the water be carried by the side of it. I do not doubt that, but I think that as long at there is an independent miller at Sandford he will abuse his water rights. There could not be a better man than Mr. Norris—he is a perfect gentleman and an honest man, apart from his character of miller.

1465. (*Mr. Harrison.*) I see by the map before me that there is a stream above King's weir that goes down and supplies Wytham, Botley, and Hincksey mills. Do those mills belong to Lord Abingdon?—Yes.

1466. Throughout the greater part of that length Lord Abingdon has the control of the water and the land adjoining?—Yes.

1467. In what state is the land adjoining?—I should say generally that it is oppressed with flood water.

1468. Is it in Lord Abingdon's power to drain that land without much difficulty?—I should say so.

1469. Still it is not done?—It is not done; but I should say that Mr. Franklin, who is his lordship's agent, and a very able man, has some peculiar notions about keeping up the flood water to nourish the roots of the grass, and he is not much inclined to drain low lands. The late Mr. Pusey entertained the same opinion; but I know that Mr. Langston, a very enlightened gentleman, used to laugh at them both. One of the great evils of land being oppressed with flood water is this, that the silt from the floods is lost. If the large floods could tumble over the banks and pass on, and leave the silt and other substances behind, that would be good for the meadows; but many of the meadows are inundated by the back water, a sort of filtered water which has left its valuable contents behind.

1470. In one of your letters you state that "the "river Thames is an ancient highway, navigable time "out of mind, and that before the Acts of Parliament "were passed to regulate the navigation, it would be "governed by common law in respect of such rights "or duties as individuals or the public had upon it?"—Yes.

1471. If it was left to go out of repair, so that this ancient navigation could not be continued or used by any person wishing to navigate, what steps could be taken at common law to have it put into a navigable state?—I doubt whether there would be any remedy at all.

1472. I suppose that a highway upon land would be subject to the common law?—Yes, certainly; but then the common law or the statute law directs highways on land to be under the care of certain officers who have the power to levy certain rates, and those officers are indictable or are liable to statutable penalty if they do not do their duty. I am not aware at present that there was ever any power for supplying defects in the navigation of the river, and although I am right, in legal language, in saying that it is a "highway," I merely used that expression in the sense that we have a right to pass along it in boats.

1473. But there is no power to call upon any of the riparian proprietors to keep it in a navigable state?—I should say none. I cannot conceive that there ever was any; in fact the ancient statutes, so far as they go, are opposed to the canalizing of the river. The ancient statutes and writs that you meet with in the old books tended to do away with all weirs and stoppages on rivers, and were directed principally to the saving of fishing rights.

1474. In the case of turnpike trusts, as the Acts of Parliament constituting them have generally been renewed from time to time, the persons lending the money have expected that the Act under which they

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lent would be renewed at the end of 21 years, and that they would be under no risk?—The Acts were renewed as a matter of course.

1475. But that I believe is not so now?—No; it is looked more after by the Government, the Government is pretty absolute about the matter.

1476. The interests of the persons who have lent their money have frequently been disregarded?—They have been quite ignored by Parliament.

1477. In any arrangement made with reference to the Thames should there not be an entirely new system, so that the Thames navigation should not in future be allowed to get out of repair as it has done?—Certainly.

1478. Would it not therefore be desirable that there should be a power in some way to levy a rate, independently of tolls upon the navigation?—Certainly, and I always thought so.

1479. Upon whom should that rate be levied?—I would charge it upon the county rates, but it would be very greatly resisted of course.

1480. You entertain a strong opinion about the navigation between Oxford and Lechlade, and that it ought to be maintained, on what grounds do you think so?—Because I think there would be a trade brought upon it. The Oxford canal takes a great deal of coal down the river, and would take a great deal more if the lower part of the river was in a proper state. I do not see why it should not take a good deal of coal up the river also but for the state of the navigation.

1481. Is there much done above Oxford for the navigation?—Hardly anything; for many years I have suggested very small improvements, and as far as the funds would go money has been granted for the purpose; but there has been such a general sense in the last 20 years that the navigation is pretty well gone, that it has been, to a certain extent, abandoned.

1482. Has the navigation ever been put into a proper state to be used successfully?—I should say that it was never thoroughly completed, in fact it never will be thoroughly completed, as long as there is a weir left on the river, until locks with double gates are substituted. We have no instances down the river of a passage from one level to another without a lock and a double set of gates; but up above Oxford there are several weirs, and it is quite an exploit to get along; the weirs are the most wretched, simple, antiquated contrivances that can be conceived.

The witness withdrew.

Adjourned till Monday next, at 12 o'clock.

Oxford, Monday, 6th November 1865.

PRESENT:

ROBERT RAWLINSON, ESQ., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

Sir BENJAMIN BRODIE, Bart., examined.

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Sir B. Brodie, Bart.

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1483. (*Chairman.*) You are resident in Oxford?—Yes.

1484. Near to what stream?—I live on the banks of the Cherwell.

1485. Do you know anything of the existing main sewerage of Oxford?—I know that there are drains which discharge themselves into the river Cherwell. My house is situate near Magdalen Bridge, on one of the branches of the Cherwell, the branch nearest to St. Clement's; near to Magdalen Bridge there is a very large sewer which runs through Mr. Fisher's garden and is discharged into the river, which lower down flows past my ground.

1486. Have you suffered any personal inconvenience from that condition of things?—Yes, no doubt. The drains near the bridge render the river most noxious and unpleasant in that neighbourhood; lately I have been away from Oxford, but I have been informed that they have been very bad indeed.

1487. I suppose that you think that that state of things ought to be altered?—Yes; I should say that my attention was first directed to the subject in Oxford by the great evils which were suffered near my own dwelling. When I was first informed that the sewer from the new workhouse in that district was about to be joined on to the large sewer which discharges into the Cherwell, it was my intention to have endeavoured to get an injunction to stop any more drains being discharged into the river at that point; I have no doubt this would have been effected. Some of the principal persons connected with the drainage of Oxford at that time came down to visit the river with me; they saw the great difficulty which there was in remedying those local evils without a total alteration of the drainage system of the city; it was very mainly in consequence of these circumstances that other persons and myself took up the question of a local board and the general drainage of Oxford.

1488. Have you heard anything of the scheme for the general drainage of Oxford?—Yes.

1489. That general system would intercept the sewer of which you complain?—Yes; I believe that it is intended to carry that sewer under both branches of the river Cherwell and by Christchurch.

1490. I believe that the whole of the sewers, such as exist, pass their contents into some one or other of the streams and rivers intercepting Oxford?—Yes. The drains from my own house do not go into the general sewer, but are discharged into the river, which runs behind my own garden; it is a thing which I cannot avoid. Besides my own house, there are several other houses which suffer the same inconvenience.

1491. You would consent to your drains being joined on to any general intercepting system which might be executed?—Yes, I should be anxious for it.

1492. Do you think that the nuisance has been on the increase?—It has been decidedly on the increase since I have been there. There is another drain besides this of Mr. Fisher's in the next house to mine, which takes the sewage of a large new district in the neighbourhood; this is a very great nuisance, not only from the sewage being discharged into the river, but because the drain itself has been broken open by floods and the whole contents exposed to the air. I should say that the river Cherwell has been seriously injured. In the memory of man there used to be a great supply of fish in the river, the fish are now nearly extinct; crayfish, which I believe will not live in rivers where much sewage is discharged, were formerly abundant and have now gone.

1493. (*Mr. Way.*) It has been said that the oxydizing power acting on sewage running in mixture with water over a distance of any length is sufficient to remove its noxious quality; do you think that that is the case?—I should say that it was simply impossible.

1494. Taking the case of Oxford, if the sewage of Oxford was in its entirety discharged into the river Thames, could we trust to the oxydizing power to take away the noxious quality of the water before it reached, say Teddington?—I should say certainly not;

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I presume that the sewage could only come in contact with oxygen from the oxygen contained in the water and also from the oxygen on the surface of the water, and we are aware that ordinary oxygen does not exercise any rapidly oxydizing power on organic matter.

1495. Is not an infinitesimally small quantity of decaying matter able to produce an injurious effect upon health?—I believe so.

1496. Therefore if a large proportion of the organic matter was removed by the process of oxydation, might not the quantity left be quite sufficient to be injurious to health?—I should think so, certainly.

1497. Do you apprehend that if sewage was applied to a sufficient area of land, the liquid running off would be equally likely to foul the river?—Speaking not from my own experience, but from such information as I possess I should say that it undoubtedly would not be equally likely; I do not think that it could be asserted that all injurious matter was removed from the water by placing it on the land, but certainly it must be very much diminished; there is very much more chance of getting rid of it by that means than by throwing the sewage into the river. With regard to the oxydation, we know that to destroy organic matter the most powerful oxydizing agents are required, we must boil it with nitric acid and chloric acid and the most perfect chemical agents. To think to get rid of the organic matter by exposure to the air for a short time is absurd; when once the matter was brought into a liquid condition on to the land, the oxydizing action would be very much more rapid upon it, because there would be a very much larger surface exposed to the action. It is, however, singular how very little the impurities cast in affect the water of the river; the Cherwell by my house is not in a very impure condition, though it is only a few hundred yards below the outlet of the sewers, but the reason is that the matter is all deposited at those outlets; no doubt it is most pestilential where it rests.

1498. (*Chairman.*) As a matter of principle do you think that it would be right for the state to insist that all net sewage should be kept out of the river?—I should think it very desirable.

1499. And especially if it could be shown that that sewage may be dealt with so as to lose the greater proportion of its noxious matter?—Yes, I do not see how throwing it into the river can be at all justified.

1500. (*Professor Way.*) We are in the habit of saying that water is better or worse according as it contains a little more or less organic matter. Taking water at Teddington, which is shown to contain perhaps a normal quantity of organic matter, or even a smaller quantity than is found in very many rivers which are perfectly fit for domestic and drinking purposes, is it not possible that such water, although it shows this minute quantity of organic matter, may be objectionable for drinking purposes because of the quality of that organic matter?—I should say so undoubtedly. We do not know what is the poison which is introduced into the water by organic matter. The poisonous quality does not depend upon the absolute quantity of the organic matter. We have no measure of the poisonous influences of water except upon human health and life.

1501. Then an analysis which simply showed that a given quantity of organic matter existed in the water supplied for the use of London would not prove that the water was in a proper condition?—It certainly could not prove that the water was salubrious; indeed it might be very injurious and yet contain a very minute portion of organic matter. I think you cannot too much insist that it is not the absolute amount of matter, but the quality and nature of that matter.

1502. Which at present chemists have no means of detecting?—Just so, and the analysis of water in which the amount of organic matter is given cannot be at all relied upon. The presence of nitrates makes some waters apparently more agreeable, but it indicates an injurious origin. Even rain water contains nitrates.

The witness withdrew.

J. Towle, Esq.

JOHN TOWLE, Esq., examined.

1503. (*Chairman.*) You are an alderman of the city of Oxford?—Yes.

1504. Are you the owner or the worker of a mill?—I am the owner of three mills and the worker of two. I let one.

1505. What are their names?—Weirs mill, a paper mill; Hincksey mill, a millboard mill. I work these two. The third is Grandpont mill, by Folly Bridge—that is rather a finishing mill; it used to be the old waterworks, and I then purchased it.

1506. At the Weirs mill what water power have you?—We used to have three engines; it would require 20-horse power.

1507. How many wheels have you?—Two ground shot wheels.

1508. Have you any steam power in addition?—Yes, 12 horse power; the engine works high pressure or not, as is convenient.

1509. What water power have you at the Hincksey mill?—We have about 12 horse power there. There is one wheel, which I can work either breast or ground shot.

1510. Have you any steam power there?—No.

1511. What is the power of Grandpont mill?—I should not call it above 8-horse power, there are two wheels, both ground shot; one is a flood wheel. We never use the last excepting when there is a great flow of water, the fall being very small.

1512. Then that is not a very profitable wheel?—It is very seldom used.

1513. Have you any steam power there? There is a steam engine for the purpose of pressing and cutting, and so on. We work the hydraulic presses and the cutting machines.

1514. (*Mr. Harrison.*) What horse power is the steam engine?—It is small, not above 6 horse. I cannot reckon much on it.

1515. (*Chairman.*) Can you work these mills all the year round?—Yes.

1516. You are not stopped either by drought or by flood?—Sometimes by flood.

1517. Never by drought?—We shut down occasionally to get a head up, but we are never positively still.

1518. How long have you worked these mills?—Hincksey mill 45 years, and Weirs mill upwards of 30 years.

1519. Are you troubled with sewage matter from the city of Oxford? The Weirs mill is nearly destroyed by it. We can make nothing but brown paper; we used to make white.

1520. How long is it since that state of things began?—Seven, eight, nine, or ten years; our paper became so blotched that we found we were throwing our bleaching away, and since then we have not used any bleach.

1521. Did you formerly carry upon the river?—We always had our coals by the river.

1522. And rags?—Rags and ropes.

1523. Since the railways have been constructed have you transferred your carrying business to the railway?—Yes. We should prefer to have coals by water, though we have far to come.

1524. Why do you not get them by water now?—The river is almost stopped up.

1525. And the navigation is ruinous?—The navigation has gone to ruin.

1526. The locks and weirs?—There is not much the matter with the locks; the trade is nowhere stopped on account of the locks.

1527. Then what is it stopped by?—By unfair dealing on the part of the millers in some measure.

1528. Which millers?—One does not like to be personal towards one's neighbours, but truth requires it, public duty demands it. A few weeks ago at Sandford lock 12 boats and the horses required for them, (and some of the boatmen had their families on board,) were kept on Tuesday, which was the first flash day, till Friday, the second flash day, before the miller would let them go through.

1529. He had the command of the water?—He had. These men had bought their flash and paid for it, and the lock gate is a very expensive one; they had to pay for it though they had been waiting there till Friday.

1530. (*Mr. Harrison.*) How does that affect supplying you with coals?—Boats do not come down the river so readily if the passage is liable to be so stopped.

1531. Where were the boats stopped?—At Sandford. I encouraged the poor men to go to the magistrates, and I stated that I would bear the expense. They appealed to the magistrates. The man's defence was that the water had not got up to the flash mark, and that he was not bound to draw till it did, and that therefore he should not draw. I contended that the flash mark was a misnomer, that what he called the flash mark was the flood mark, and whenever the water got up to that mark he must draw, boats or no boats. The Act of Parliament fines him 10*l.* when the water gets up to that iron. The water is supposed to be over the meadows when it gets up to that mark, and it is over the meadows.

1532. (*Chairman*) Are the inhabitants of Oxford liable to be flooded?—Very much. I consider it decennial. We had it it in 1809, 1821, 1831, 1841, 1852, and now we are three or four years past when a flood is due. When a flood does come then Oxford is surrounded. We have had to get out of our windows into a boat. I have had to live upstairs for a fortnight. In the March of the year that the Duke of Wellington died the flood overflowed the railway, and so it will again. At that time there was 2½ feet fall at Sandford over this embankment running from the high ground on the west, Bagley, to the high ground on the east, Sandford churchyard.

1533. Do you conclude that you are free from flooding now, or that it may occur again and again?—We shall certainly be worse than ever we were.

1534. Have you formed any idea whether land drainage has made any difference to you in the flow of the water?—The water comes down the river more quickly; it used to be always the third day with us.

1535. Do you think that it rises higher?—It will rise higher, and it will sooner get to running over the embankment When it once runs over the embankment it rises very slowly, but any flood will carry us up nearly to the surface of that embankment.

1536. Do you think it possible for an engineer so to regulate matters as to remove that injurious flooding?—Certainly; so much so that I should have been at law with the parties long ago, but I did not like to fight a country's battle.

1537. You think that you could remove the cause of flooding, and even improve private property at Sandford?—Yes.

1538. And I need hardly say that if you removed the cause of flooding you would improve private property in many other places besides Sandford?—Yes.

1539. (*Mr. Harrison.*) When did they build the new lock at Sandford?—In about 1830.

1540. How were boats passed at Sandford before the pound lock was built?—They always went through the pound, but occasionally there was a lighter at the end of a big barge, for we used to go there with 160 tons, and we have an old boatman living in Oxford who worked these boats. He has gone down this river with 165 tons.

1541. (*Chairman.*) What do you think he could take down now if he tried?—Not 30 tons, but then the boat had a broader bottom.

1542. If the boat had the same breadth of bottom?—I can hardly conceive, because they have let the sand banks and everything get into such a condition, but they sometimes even now take a large lot of timber.

1543. (*Mr. Harrison.*) Was any alteration made in the level of the sills of the pound lock when it was rebuilt?—I cannot say, there was a difference made at the sill of the lasher.

1544. What was that difference?—I should think about a foot; the sill was for a long time in the form of something like a bank; a high piece of wood was raised on the top of the lasher sill, I watched it narrowly, and this was continued for two or three years, and then the lasher was solidly raised and repitched quite up to the top of that sill; it was in Mr. Swann's time I think that this was done.

1545. Who fixes the level of the sills of the lashers and the high-water marks, or the water marks for the working of the mills?—The high-water marks are fixed by the Commissioners of the Thames Navigation, they having three views,—first the interest of the miller, next the interest of the navigation, and next the interest of the landed proprietor; those are the three points which it is the duty of the Thames Commissioners narrowly to look to when they fix the levels.

1546. Both of the sills and of the head of water?—Yes.

1547. Have individuals to obtain permission of the Commissioners before they commence any such works?—The river has been so entirely neglected that millers have done as they have liked.

1548. Do you merely say that as a thing which is generally known, or have you any definite knowledge of it?—I lower my sill and I raise it. I do as I like with my lasher, I have nobody to interfere with me.

1549. At which mill is that?—At the Weirs mill, and it has been done at Sandford.

1550. (*Chairman.*) You yourself have done just as you thought proper?—Yes.

1551. And you think that the miller at Sandford has done the same?—Yes.

1552. Do you think that other millers have done so?—I will not be certain.

1553. But you think that they may have done so?—I do.

1554. And that the Thames Commissioners have allowed any powers which they had for regulating these things to be idle?—I say that they have not used their powers.

1555. Are you a Thames Commissioner?—Yes.

1556. Then you have not used your powers?—Yes, I have, too vigilantly to please the parties and powers that be. I have asked over and over again to have the water regulated at Sandford. I saw that the poor men always lost their flash at Sandford, not once but always. The time for drawing at Sandford is 10 o'clock, but if the miller was not cross-grained what difference would it make to him whether he drew at 8, 9, 10, or 11? It never was a question with me whether I draw at 4 o'clock in the morning, or at 8 or 9. I have a lock to attend to, and the poor men have come to me and said, "Mr. Towle, we are pulled up at the "Long Bridges, will you shut down for us an hour?" Perhaps all my steam was at work and all my men were at work, but I immediately shut down to get the poor men off.

1557. Are you aware that at the lashers just on the Oxford side of the Iffley lock, for some years past temporary boards have been placed, and not placed by the Thames Commissioners?—Yes.

1558. To keep up the water level for the purpose of the mill?—I placed them there myself.

1559. Did the bathers knock them down at any time?—Yes; I fastened them up again, but I never could keep them on.

1560. Are they not now chained up?—I do not know; I only know that if boards were not so placed the navigation would be entirely stopped. The sill of that lasher is 16 inches below what they call the flash mark. I have said to the boatmen, "Unless you keep "those boards on that lasher I will not shut down for

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"you when you pull up." I have used those threats, but I have never carried them out.

1561. (*Mr. Harrison.*) Is not the water which you get for your mills divided at King's weir?—Yes.

1562. A part of it goes down by Wytham and Botley and Hincksey, and another part comes down to Wolvercot mill?—Yes.

1563. The navigation being between the two?—Yes.

1563*a*. I see that in a report of one of the engineers who were employed about the navigation it was proposed to put what he called a gauge-weir to regulate the supply of water to those two mills. Do you know whether anything of the kind has been done?—No.

1564. Nothing of the kind has been done?—No.

1565. You say that you would like still to get coal by the river if you could; is not coal brought by the Oxford canal?—Yes.

1566. To near the Castle mills?—Yes.

1567. How far is your Weirs mill below that?—About a mile, but the passage thence to my mill is all stopped up at the Long Bridges by the stuff coming out of Oxford. I leave the main stream at Long Bridge to get to the Weirs mill.

1568. The effect of your raising the lasher at Iffley would of course be to increase your head?—Yes.

1569. What is the effect upon the mills above?—To injure them.

1570. Then you do it if you can profitably, to the injury of those above you?—The mill above me is mine.

1571. But you seem to put those boards above the height to which you are restricted, do you not?—There is a margin from the top of these boards to the flash mark, of 10 or 12 inches.

1572. What right have you to interfere at all with the lasher at Iffley lock?—None whatever.

1573. If the Sandford people raise the lasher they increase their head?—Yes.

1574. How do they affect your two mills, Hincksey and Weirs mill?—They leave me with 16 inches fall at the Weirs mill, and about 2 feet at the Hincksey mill, while at Sandford they have 8 feet fall. 18 inches is a great fall for the Weirs mill now that they have altered it.

1575. Is it within your knowledge that the lasher at Sandford mill has been raised?—So much so that the fordways, which used to be as good to go over as a turnpike road, are now impassable—the horse is swimming. There are parties who own lands near my mill who cannot get at them without going three miles round.

1576. When boats are stopped at Sandford mill would the effect of the miller letting down the flash water so as to get those boats past be to give more head at your two mills above?—The Sandford miller, by keeping the water there after it is passed down from me, drives it back upon my mill.

1577. So that you have an interest in encouraging men to get the flash carried away?—Decidedly I have. The fact is that the poor men lose their flash.

1578. (*Chairman.*) And you lose your power?—And I lose my power, and the reach below me becomes a mill pond amongst all the rushes and weeds.

1579. Do you know of any boards being put up at the Sandford lashers similar to what you put up at Iffley?—This very year I have seen them and knocked them down.

1580. Then you knock somebody else's boards down and they knock yours down?—We are in a bad state, and I hope that you gentlemen will set us to rights.

1581. Have the Thames Commissioners ever made any overtures to you and asked you to serve upon the general committee?—I have been elected on the general committee.

1582. Have you served upon it?—Yes, it is a compliment to be upon it, but I am no more in favour. I got a local committee, that is to say a small committee, up at Sandford, and a report from Mr. Venables, and just when I was about to get something done the powers that be in Oxford thought that I knew too much about it, and I was displaced and that committee came to nothing.

1583. Do you think that it is practicable to obtain any good working board out of the Thames Commissioners as at present constituted?—Certainly not.

1584. How do you think the Thames ought to be managed in future?—I would have the management in a few interested hands.

1585. What kind of persons?—Shareholders, bondholders. Let the board be elected by the bondholders, and not by 400 or 500 disinterested people who elect each other out of compliment.

1586. (*Mr. Harrison.*) Are these boards which you say are put up at these different lashers all removed during the floods?—Yes.

1587. What difference of level is there during floods above and below Sandford lock?—Some years ago the present surveyor to the Commissioners and myself went down to Sandford lock, and there happened to be a flood just as there is now, or a little more; we found that at Sandford mill itself there was not quite 3 feet fall between the flood above and the flood below. Then we went back and measured the fall from where the water is still above to where it comes to a settlement below, and we found the fall to be 4 feet 7 inches.

1588. What is the difference at your mills, the Hincksey mill and the Weirs mill, in a flood?—At the Weirs mill we are quite on the level.

1589. There is no perceptible fall?—No, I could turn my wheel to run the other way when there is a high flood.

1590. Have you ever had your wheel turned the wrong way?—I cannot say that I have—the tackle inside would prevent it.

1591. At Hincksey mill what is the fall?—It is better; but we have been thoroughly level at Hincksey.

1592. Have you ever known it thoroughly level at Sandford?—No, not by feet.

1593. Not in the highest floods?—Never in the highest flood. You might get into a boat at a high flood at Standlake and might come through the country in a boat miles and miles till you came to Sandford, and then you must stop.

1594. Because of the sharp fall of the water?—No, because of the embankment. In a high flood all our meadows are under water here before the water passes over this embankment.

1595. In a very high flood how is the level of the water at the other mills above, say Castle mill?—At Castle mill when it is a high flood they are level.

1596. And at Wolvercot?—Yes, it looks like a little sea of water all the way down without any fall; you see the water almost dead, not rustling and bustling to get through the country, to get through the hedges and gateways—as it is upon the Trent and other rivers—it comes to Sandford as dead and flat and is as level as a looking-glass, and there it lies for days waiting its turn to get through; there are only four little doorways.

1597. Do you know the size of them?—Yes, altogether the openings will measure 17 feet, but the weeds and withies come down, especially in times of flood, and get round those large posts, which are 14 inches broad, so that the posts are so near together that they will hardly let a man between them, the openings get so clogged up. Before the alteration at Sandford there were rymers and no posts, the passage was then all open and let a body of water through. The next thing was that two gates inside the old mill which had been used to be set as fishing traps were done away with. To compensate for the loss of this outlet, Mr. Swann put underground furrows into this new mill to satisfy the Commissioners that he had the means of letting the floods go. These underground furrows proved to be so dangerous, they roared and tore so and were letting a body of water 8 feet down, and up again on the other side, that they were obliged to be shut down, and they have never been in operation.

1598. What is done with those openings now, are

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they built up or are they kept closed ?—Sometimes it has been pretended that they were at work, but anybody going behind the mill would see in a moment whether there was any water coming through, and it was of no use to say that they were at work.

1599. (*Chairman.*) Do you think that it is possible to arrange for all these mills to continue to work and yet flooding to be prevented at Oxford?—Yes. I hesitate very much to do away with mill property. I think that it is the most valuable property which the country possesses. I believe that mills might all be worked upon the ground-shot principle. That mills can be worked to a very great advantage both to the land and to the navigation I have not the least doubt. The fact is that if they were to do away with my Hincksey mill the whole valley would become a swamp in two or three years. No parties will be at the trouble of mowing the weeds two or three times during the summer, throwing out all the mud-banks and keeping the river open—no person will spend his money but the miller; and without this care the cattle on each side stalking in to drink when the water gets down almost to the bed of the river would entirely trample the river up in two or three years.

1600. (*Mr. Harrison.*) Do you keep the channel between Hincksey mill and Botley mill clear of weeds? —Yes.

1601. Do you do anything else ?—Yes, I have men at it continually.

1602. Doing what ?—Putting ballast and sand out and keeping up the banks. Parties will keep encroaching; I once spent 1,200*l.* over a lawsuit; I established my right, but I found that I had better keep men at work than go to law again.

1603. With regard to the Weirs mill do you do the same, do you keep the river ballasted ?—Yes, at Long Bridges, but it is of no use. I have ballasted continually at the Long Bridges, but there will be an island formed there soon ; one would have been formed before if it had not been for me ; when the water is drawn the land is now above water at a spot where there used to be water sufficient to swim boats. There are islands below me as well.

1604. (*Chairman.*) Would it be possible for the Commissioners to take the control of the water into their own hands, and so arranges its delivery as to be convenient to the millers as a class, instead of allowing each miller to have absolute control of it at his own mill ?—I am sure of it.

1605. Would that be the best way ?—I am sure that it would.

1606. Now you can draw the water at times when you like, and you can let it off to your friend below when he does not want it, and you can keep it back when he does want it ?—Yes, but we cannot pen higher than the mark.

1607. But you can pen it at certain times when he would almost give you anything to have it ?—Yes.

1608. (*Mr. Harrison.*) Were those flashes which you spoke of as being brought down the regular flashes ordered by the Commissioners, or some purchased by the boatmen ?—I do not think that the Commissioners have anything to do with the buying or selling of the water, or interfere with it—the men up at King's weir and higher up the river expect the boatmen to come and buy this water, and if they do not do so they must let a little of it down.

1609. Is it not a very hard thing to millers that the water should be kept back in that way to serve flashes instead of coming down regularly to them ?—Immensely hard.

1610. Can you wonder at the miller taking all the steps in his power to make the best use of that water when it comes down ?—Certainly not.

1611. Then why do you blame the man at Sandford for not letting it off ?—Because he is doing what we consider an illegal act. According to the regulation and what I have done for many years, the water should be drawn at the mills on every Tuesday and Friday for three hours.

1612. I understood you to say just now that this was not under any regulation, but that the water at the river was kept back at the request of the boatmen, and that they paid for it and brought it down ?—I believe that that is the case. I do not know how the practice began. I believe any person, and not boatmen only, can have water by paying for it.

1613. If I went up now and paid these men I might bring down a flash of water and flood the meadows ?—I think that you could, because it is occasionally done, that makes me think so, but I am not sure.

1614. (*Chairman.*) The Thames, has it always been a flash river ? — Yes, with a proper regulation, one pound will buy water enough to carry a barge all the way to London.

1615. (*Mr. Harrison.*) When one of these flashes comes down can you hold it back so as to use it ?—I cannot hold it back.

1616. You must let it go on to Sandford ?—Yes.

1617. And there they can hold it back ?—Yes. The reason why I cannot keep it back is that I could not back it up ; but at Sandford there is a network of streams and flood waters and railway cuttings, enough to swallow up any quantity of water that can be brought by a flash. The railway has hurried the water to that point, and when it gets there it goes no further; it must come through these four little places—I mean the waterways at Sandford. The railway company are liable to an action from me any day for filling the tail of my mills and preventing its going any further, but, as I have said, I have had a 1,200*l.* taste of law.

1618. (*Chairman.*) Have millers the power of working all night if they like ?—Yes.

1619. If they did work all night could they not intercept those flashes until they have worked it through their mill tail ?—No, because the men go with their flash on a Monday. The flash opens up the river and the barges get down to Oxford, and then at 10 o'clock on Tuesday they must be supposed to draw at Sandford, and so on to Abingdon. I should not get the water for a longer period than an hour.

1620. (*Professor Way.*) I think you stated that at Weirs mill you made brown paper ?—Yes.

1621. Do you make no other kinds of paper ?—No ; none but browns and middles—coarse papers. We do not use bleach at all.

1622. What description of fibrous materials do you use ?—I use the usual rags, but I was almost the first man who used straw. I use a great quantity of straw for a peculiar kind of make which is called press-boards.

1623. You use that for making thick card board ?—Yes, and for making a very peculiar kind of board that is used by engravers. My machinery is peculiarly adapted for straw. I lost my bleaching powers.

1624. Do you still continue to use rags ?—Yes.

1625. And straw ?—Yes, and Esparto grass.

1626. Can you state to the Commission what quantities of those different materials you use. First, what quantity of straw ?—I use perhaps 150 tons a year of straw.

1627. And how much of Esparto grass ?—We do not use so much, perhaps 10 or 12 tons in a year.

1628. What quantity of rags do you use ?—I might say 100 tons of rags.

1629. What are the first processes that those materials go through ?—A strong boiling in alkali.

1630. The whole of them ?—Yes, the straw, and especially the Esparto.

1631. And to a certain extent the rags are boiled ? —Yes, they must be boiled, but not much.

1632. What quantity of alkali do you use ?—4 or 5 tons in a year, or rather more.

1633. You speak now, I suppose, of the ordinary soda ash of commerce ?—Yes, not washing soda, but alkali.

1634. You render it caustic before you employ it ? —Yes, we boil it with lime.

1635. What becomes of the residue of the lime which settles at the bottom of the boilers ?—We keep

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it. I try to use it upon the land, but I do not find it of much use.

1636. What do you do with it?—It ultimately goes to the land along with the refuse rags.

1637. Do you mean to say that it does not go into the river?—Yes, I think it is too valuable to throw away.

1638. The straw requires the largest quantity of alkali and the longest boiling?—Yes, we boil it for 18 hours, and we boil a ton at a time.

1639. Are the materials boiled in iron or in copper boilers?—In iron boilers.

1640. After the process of boiling is concluded, what becomes of the first liquid?—That we try to blow out from one boiler to another to save heat and the little alkali that is left; the liquid ultimately goes into the river, but that I think is a great waste, and I am endeavouring to economise it, because I think it is a most valuable manure. I am thinking of running it out into the ashes.

1641. From the boilers?—Yes.

1642. Is it a dark-coloured liquid?—Yes it is; it is as dark coloured as treacle.

1643. Then the materials, I suppose, are washed in the ordinary way?—Yes, but we do not wash the brown paper materials.

1644. Not so much, but you wash to get rid of the alkali?—Yes, because it is pernicious to the wires and felts.

1645. That wash water, as I understand, goes into the river?—Yes.

1646. After that there is no other material that goes into the river?—None whatever.

1647. Is Hincksey mill a paper mill?—It is a millboard mill for the manufacture of brown millboard for box and portmanteau makers. That millboard requires no bleach.

1648. Are the same materials used at Hincksey mill as at Weirs mill?—No, at Hincksey mill material is entirely Government rope, bought generally at the Government stores,—junk.

1649. There is of course a good deal of tar matter in that?—Yes.

1650. How do you get the tar out?—It works in with the millboard. We do not boil it; we cannot make good millboard unless with good tarred rope.

1651. You do not boil it with alkali?—No.

1652. Do you use any alkali at Hincksey mill?—None whatever, no chemicals whatever.

1653. Do you wash?—No, not at all.

1654. You have nothing to wash away?—No, it is clean Government rope.

1655. You merely break it in the engine?—Yes, and then it goes into the pit and is worked into board. The liquid is very sweet clean water.

1656. Grandpont is a flour mill, is it not?—No, that is a mill to which we send from Weirs mill to roll, and cut, and finish, and send out. No materials are worked out there.

1657. It is a finishing mill?—Yes.

1658. Weirs mill is the only one at which you use alkali?—Yes.

1659. Is it practicable to keep out that alkaline liquid?—Yes.

1660. Is it not very easy to utilize it?—Yes.

1661. (*Mr. Harrison.*) What means would you take for that purpose?—Instead of running the liquid into the river, I should have a spot selected for a pit, where there would be the ashes and everything that was taken from the steam engine, and perhaps the refuse, leys, and dust, and I would let the liquid go into that pit, and then I would carry it out to my land. I am a farmer as well as a miller. I would take the whole of the liquid. A small pit would do for it and would cost very little.

1662. Do you consider, if this Commission were to recommend to the Government that paper makers should be prohibited from throwing any refuse into the river, it would not do you any injury?—Yes, not a bit of injury.

1663. Have you had any complaints made against you?—None; but perhaps I have been open to them.

1664. I think you stated that the sewage had destroyed your Weirs mill so far as the white paper manufacture was concerned?—Yes.

1665. I suppose that was because the water, tainted with sewage, was not clean enough?—Yes, those great blotches of filth damaged the sheets.

1666. Do they not make white paper at Sandford mill?—Yes, they do.

1667. How far is that below your mill?—There they have put up large filtering ponds.

1668. (*Professor Way.*) Did the sewage matter of which you complain affect the mill in any other way besides spoiling the water?—It made my people exceedingly ill.

1669. If greater quantities of sewage were thrown into the river the evil would be magnified?—Yes, and they are now bringing down a great deal more.

1670. (*Mr. Harrison.*) Are you an advocate for putting sewage on to land?—Yes, decidedly. I have spent a great deal of money on it. Being a farmer's son I have witnessed its effects for 50 years.

1671. Are you a farmer?—Yes.

1672. Have you any land lying on the banks of the river?—Yes, some small meadows about the mills.

1673. Are they flooded early?—Yes, they are sometimes under water; they have only flooded us this very day on the Thames from Sandford to Oxford, whilst the rest of the valley remains unflooded, and I hope you saw that difference this morning.

1674. (*Professor Way.*) Supposing nothing to be done at Sandford mill to alter the present state of the water level there, it would be useless, would it not, to try to apply sewage to the land in the neighbourhood?—Yes.

1675. (*Chairman.*) If the local board of Oxford proposed to carry the sewage of Oxford below Sandford mill, do you think the miller would make any objection?—He could not make any objection without it was that you threw the water into his mill tail, because there will be nothing but clear water.

1676. You would take nothing from his mill head?—No. I might complain of it as well. I was offered 2,000*l.* to allow Sir William Cubitt's plan for draining Oxford to go on, but I said, "It will never answer, and I will not have the money."

1677. What would the 2,000*l.* have been for?—For compensation for the injury which they supposed I should suffer from the flushing apparatus which would draw from my mill head?

1678. The present plan being, as I understand, based upon Sir William Cubitt's plan, they would still take a part of the water from your mill head?—Yes.

1679. If your water goes into the mill tail at Sandford lock they would consequently take an equivalent portion from that mill head?—Yes.

1680. Then they will have the millers complaining on all sides?—Yes, that is quite certain.

1681. Do the millers complain much or little when they think they have the water taken from their mill-heads?—They are very sensitive about it indeed, even about a rathole, or anything which takes from them the least particle of water in summer time.

1682. (*Mr. Harrison.*) With regard to the land next to your mills, do you find that your stock is at all affected by feeding upon the meadows which are subject to these floods?—At this time of the year I have been in the habit of losing three or four stirks, and therefore I bring them out from the meadows; there is generally plenty of grass by the side of the river, but I dare not put them there at this time of the year.

1683. What effect is produced if you put sheep on to the meadows?—They do wonderfully well, they get fat just like rabbits.

1684. Is not the pasturage liable to rot them?—Not after such a summer as this last, but it would be so after a wet summer.

The witness withdrew.

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JOHN KIRBY HEDGES, Esq., (The Castle, Wallingford,) examined.

1685. (*Chairman.*) You are a solicitor living at Wallingford ?—I am a solicitor and a banker there, my residence adjoins the town.

1686. Are you one of the Thames Commissioners ?—Yes, and a member of the general committee.

1687. How frequently does that committee meet in a year ?—The general committee is appointed by the Commissioners annually, and meets, I think, about twelve times altogether in the course of a year, including sub-committee meetings.

1688. Is that according to Act of Parliament ?—The Act directs the time and place of the first committee meeting only.

1689. Do any discussions take place as to the working of the flashes or the cleansing of the river ?—Constantly.

1690. Also as to fixing the high-water marks ?—That was done years ago.

1691. They were fixed once and for all ?—Yes ; but I believe we have the power of altering the flash marks under the Act of Parliament.

1692. (*Mr. Harrison.*) Have they not been altered ?—Not recently, I think.

1693. In 1853, for instance ?—Possibly.

1694. (*Chairman.*) How long have you been a member of the general committee ?—I have been a member for only about 3 years.

1695. How long have you been qualified as a Commissioner ?—For about 20 years, but like many others I have seldom acted.

1696. Do you consider that the Commissioners are an efficient body or otherwise ?—Certainly not, the commission is too unwieldy.

1697. Is the river in the same condition now that it was when you first knew it ?—It is getting worse.

1698. Do you think the railways have been the cause ?—Perhaps the primary cause has been the railway ; but I think that to a very great extent the cause is the opposition which the Commissioners have always and invariably met with from many of the old lock owners and also the millers. When I first became a member of the general committee my wish was to introduce a system of through rates at greatly reduced tolls, with which there was every reason to believe that the river would be self-supporting, and something left for the bondholders. In order to effect this it was necessary to obtain the concurrence of the old lock owners, because they have had reserved to them, under various Acts of Parliament what they call the old lock dues. Application was made to these parties. I believe there are about 20 of them, and I believe that two-thirds consented to the arrangement; but the other third either dissented, or hampered us with conditions which amounted virtually to a dissent, and the majority having no power to bind the minority, the proposal fell to the ground.

1699. You are aware the commission is now in debt ?—Yes, and if the debt and the old lock dues could be got rid of as prior incumbrances, or by way of compensation, and the navigation put into a good working state, I do not doubt at all that the traffic would be greatly increased.

1700. Who do you think would be the proper persons to raise the money necessary to get rid of the debt ?—My opinion was that the Government would do it. I attended with two deputations to the Government, and certainly I had some reason to hope that help would be given.

1701. How do you think the Government could step in and advance money for a purpose of that kind ?—Supposing the present bondholders give the Government a priority, there would be fair security I think.

1702. You do not anticipate that the Government should give the money absolutely ?—No, I do not. I suppose that they would require security.

1703. And some chance of repayment ?—Yes.

1704. Do you think that if an Act of Parliament could be obtained to settle all conflicting interests, something like the Encumbered Estates Act, a new company might be formed ?—I have no doubt of it.

1705. Do you think it would be advisable that the management of the Thames, looking at its various interests, fishing rights, mill rights, sewerage rights, and frontages of riparian proprietors, should be placed in the hands of a commercial company ?—A commercial company would be hardly the proper body to take the management of those interests.

1706. Do you think the present commissioners would be a fit body to elect a working board ?—The commission comprises the magistracy of the county—the leading men and active tradesmen—and I think it would be a very good suggestion to let a small body be appointed by the general body.

1707. Just as the town council is elected from the ratepayers and owners of property ?—Yes. I think the general body represents all interests.

1708. If the Government were asked to find the money, does it not strike you that the Government might desire to appoint the Conservancy Board ?—It is natural to suppose so.

1709. If the present Board of Commissioners elected a working body to govern and manage the Thames, you would have what is acknowledged to be an English mode of government—that is, you would have the persons to be taxed appointing the persons to tax them ?—Yes.

1710. Whereas, if the Government appointed the members of the board, you would have a Government board merely looking after the improvement of the Thames, without having any of the local feelings of the present body ?—Yes, that would be so.

1711. In Ireland there is a Government board, and in such a case as that of the Thames the owners of riparian property, or the majority of them, would ask the Government to advance the money to execute the works, giving the property as security ; do you think that that would be an advisable mode of proceeding in this case ?—I question it.

1712. Supposing the Government estimated the improvements at 100,000*l.* when they were commenced, they might cost 200,000*l.* or 300,000*l.*, and do you think that the riparian proprietors and others liable to be rated would like that state of things ?—As a proprietor myself I should not at all object to a moderate tax.

1713. But I presume you would like to know the end of it ?—Yes.

1714. And also like to have some control over the mode by which you were subjected to that tax ?—Yes. I cannot see that any successful management can be obtained by transferring the matter to the Conservancy Board in London, unless there is a great intermixture of the local element.

1715. At present the riparian proprietors appear to be almost helpless in the hands of the mill owners and the old lock owners ?—Yes, quite so.

1716. Their lands are liable to be flooded by the millers keeping up the water or sending it down, and they appear to have no remedy ?—There is a remedy in the Act of Parliament, but the clauses, coupled with the byelaws, are so ambiguous that practically there is no remedy.

1717. (*Mr. Harrison.*) There is, I think, in the first Act of George 2., a clause providing that penalties shall be paid for damage done to landowners' crops by flooding. Is that clause ever put into operation ?—Never, within my knowledge.

1718. But the Act has not been repealed ?—No. Other provisions are made in 15 and 28 Geo. 3. So far most of the clauses are plain enough until you get to some of the subsequent Acts and Byelaws, which completely counteract the effect of the earlier clauses.

1719. (*Chairman.*) Has there been any damage done to the land by flooding to your knowledge ?—I am not aware of it ; but there is no doubt that the millers keep up the head of water much higher than they ought to do.

1720. And matters have been allowed to drift into their present condition, I suppose, from want of proper energy on the part of the Commissioners whose

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business it was to attend to them, and who have power to enforce their regulations?—It arises more from the ambiguity of the Acts of Parliament and byelaws and the cumbrous nature of the remedy. When the case that was mentioned by Mr. Towle was brought before the magistrates, a month or two ago, I believe it was compromised, because the chairman of the sessions said, "Really, we cannot understand these Acts of "Parliament."

1720*a*. Do you think that if there was a reconstitution of the Conservancy Board, it would be wise to repeal every existing Act of Parliament and begin with a new one?—I think so; but in addition to those Acts of Parliament there are various bye-laws which are inconsistent with one another.

1721. Do you know whether any valuation has ever been made of the property involved in the Thames navigation?—I have heard it mentioned that it would amount to about 10,000*l.* or 12,000*l.*, whether that is correct I do not know.

1722. Would that be a set-off against the 84,000*l.* of debt?—It is a question whether the mortgages affect the realized property. I believe it is considered that the mortgages are simply mortgages of the tolls, and not of the realized property.

1723. There has not been, I suppose, a valuation of the area influenced by the river, so as to give an idea of the capital upon which you could levy a rate for the maintenance of the Thames?—No valuation has been made, and the difficulty would be to draw the line where the benefit ends.

1724. Would it not be fair that such area should include agricultural land to which you would give an outfall, and agricultural land now liable to floods that would be embanked, and villages and towns to which trade would be brought by the restoration of the navigation?—Yes.

1725. Might a properly constituted commission lease the navigation to a company to work it and maintain it?—Yes.

1726. And re-let or lease the mills?—The navigation could not be carried on without interference with the mills, so far as the water power is concerned.

1727. (*Mr. Harrison.*) The Thames is called by the town clerk an "ancient highway"?—Yes.

1728. Is it in your opinion comparable with a highway upon the land, as far as the maintenance of it goes?—Highways on the land comprise turnpike and parish roads; the former are kept up in the same way, by borrowing money on bonds and by tolls, the latter by rate.

1729. What happens in the case of the failure of these bonds?—When the tolls are insufficient the parish has to keep the road up.

1730. Upon whom, if the present commission were done away with, would the responsibility fall of maintaining the Thames as a highway?—That is a question of law I am not able to answer. We all understand the Thames to be a highway, but whether there is any obligation on the part of the public to keep it up as a highway is another point.

1731. Before any commission was appointed under Act of Parliament, was there a responsibility on the part of anyone to keep the river in a proper condition for the passage of boats?—The millers exercised their rights subject to the passage of boats.

1732. They were obliged to enable boats to pass?—Yes.

1733. The first Act of Parliament, I mean the Act of Geo. 2., was passed in a great measure to regulate the passage of boats, was it not?—Yes, to regulate the charges made by the millers.

1734. Does that show that up to that time the responsibility was upon the shoulders of the old lock owners to keep the river in a navigable condition?—I do not quite see that that follows; they were prohibited from putting any obstruction in the way of the passage of barges, and they were bound to let them pass upon receiving a small toll; but there is nothing in the Act which throws on the mill owners the onus of keeping the river clear of obstructions.

1735. No, but they would have to use the water so as to pass boats?—Yes, as far as the water goes they would be perhaps under that restriction.

1735*a*. The subsequent Acts appear to have removed some portion of that responsibility on to the shoulders of the Commissioners?—Yes.

1736. If the Commissioners are to pass away, upon whom would that responsibility fall?—I suppose it would revert to the mill owners, that they would be liable either to cease working their mills and throw the river all open, or else, if they kept up the weirs, to make provision for the passage of boats.

1737. Having that responsibility hanging over them, do you not think that the old lock owners are justified in still claiming their tolls?—Certainly, if it be so, that responsibility is a reason which I think gives them a better title than I at first thought they had; but on the other hand the old lock owners were generally mill owners, and they seem to have been amply compensated by increased water power given to their mills in consequence of the erection of new pound locks, and also of their exemption from the repairs of a large portion of the weirs. Nearly every mill must have been benefited by the pound locks, because there is less loss of water. I understand that in olden times the practice was to shoot the barges down the weir, and the loss of water in this way was immense, so great indeed that the mills were stopped for 12 or 14 hours afterwards. I also understand that within 40 years it was the practice of millers to draw up all their tackle, to create the flashes; all that must have wasted the water fearfully, and the consequence was that they could not work the mills for a long time; now, under the new system, millers at the pound locks grumble if they lose an hour.

1738. Are you aware that in the construction of the navigation with pound locks the water has been raised to the mills so as to give them a greater head?—The mills have a greater and more regular supply.

1739. Is the water kept now at the same level as it used to be before the pound locks were constructed?—I cannot say, but I think that some local inspection is necessary in order to prevent irregularities on the part of the millers; the drainage of the towns and the diversion of the water, and many other things, require attention on the spot.

1740. Looking upon the Thames as a highway, and that it is desirable, whatever steps may be taken, that provision should be made for maintaining it as a highway, is it advisable, do you think, to put it in the hands of a private company?—Not as a public highway.

1741. Is it then desirable to make the parties who are interested in it, whether as riparian proprietors or lock ownrs, in some way responsible for its maintenance in case the tolls are not sufficient?—It would be a very heavy tax, if they are to deal with the debt and the old lock dues, and the current expenses of maintaining the river.

1742. (*Chairman.*) Do you think there is any hope of being able to buy up the debt at anything like its marketable value?—I think so. I believe that it might have been bought up four or five months ago for less money than it could be now. I believe the bonds were offered at 5*l.*, but what the effect of this agitation may be I do not know.

1743. (*Professor Way.*) You are speaking, I think, of a period before the committee of the House of Commons sat upon the question?—Yes, and since then.

1744. Do you know anything of the condition of the town of Wallingford?—Yes.

1745. Is it well sewered or otherwise?—It is not well sewered.

1746. Do any of the drains which exist pass refuse into the river Thames?—Yes. There are, I think, two or three drains that empty themselves into the river.

1747. What is the population of Wallingford?—In the town proper only about 3,000.

1748. What is the population of the district?—About 10,000, including villages.

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1749. Is there any local form of government at Wallingford?—There is a local board.

1749*a*. Have they at all contemplated sewering the town?—They have, but the cost I believe is a bar.

1750. Is there a water supply at Wallingford?—Not by any artificial means, except by pumps. The town is immediately on the banks of the Thames, and the inhabitants obtain water at about 30 feet down.

1751. (*Mr. Harrison.*) Can you state what the stratification is at Wallingford?—The upper stratum is sand for about 10 or 12 feet, and then we get down into marl.

1752. Are the cesspools made down to the marl?—They vary in depth.

1753. Is the water that the inhabitants obtain from the wells at all affected by the cesspools?—In one or two places it is.

1754. Has that had any effect upon the health of the inhabitants?—I am not aware that it has. I only allude to two or three cases in which complaints have been made by the tenants. My opinion is that the flashes very much purify our town. The system of flashes seems to me to be very useful in a sanitary point of view.

1755. (*Chairman.*) Do you mean by creating a stronger current in the river?—Yes, and acting as tidal water would, washing everything away. There are a great number of ditches in which there is matter which is offensive in summer time, and these flashes wash that away.

1656. If the town were properly sewered, and all filthy matter were kept out of ditches, and refuse kept out of the Thames, there would be no need of flashes?—No; but still I think it is almost impracticable in the neighbourhood of towns to prevent an accumulation of filth; indeed the very drying up of water in summer creates a disagreeable nuisance from ditches.

The witness withdrew.

Captain Frederick Dashwood (of Kirtlington, Oxford) examined.

Capt. F. Dashwood.

1757. (*Chairman.*) Do you farm land in the vicinity of the Thames?—I do not myself, but my brother Sir Henry, for whom I act as agent, has some property on the banks of the Thames.

1758. Where is it situated?—In the parish of Yaunton.

1759. Does the present condition of the Thames in any way affect that property?—It was supposed to affect it very much. A meadow of which my brother is part owner was considered to be one of the worst meadows on the Thames. But by damming up a ditch that went into the river and getting a good outfall in another direction we find great improvement, and the mill does now no injury. Before this the whole mischief was supposed to be done by the mill.

1760. What was the cost of the work?—From 3*l*. to 5*l*.

1761. What benefit has it been to the land?—Very great.

1762. This improvement was effected by your brother and not by the Commissioners?—Yes.

1763. Had he to obtain their sanction before it was done?—He had not. It was done as a trial.

1764. You have found that by simple means you have got rid of a great evil, and that it was not the mill that did you any injury, but the neglect of the landowner?—Yes. We always had an outfall ditch, only we did not take advantage of it, and one old ditch instead of being an outfall was an infall.

1765. And your opinion is that many other landholders might do the same thing as your brother has done?—Yes. If they would join together they might protect themselves a great deal more than has been done.

1766. (*Mr. Harrison.*) Have you seen the works at Port Meadow?—I have.

1767. Are these of a somewhat similar character to yours, only more expensive?—Yes.

1768. Are you aware that it is in contemplation to carry out similar works below Newbridge, about six miles long, towards Ensham.—Yes, I am, and I have seen the plans this morning.

1769. Would the carrying out of those works be a desirable thing upon the river?—I think so, the principle appears to me quite right; but I think from what I have seen of the plans and sections it might be effected more simply and less expensively.

1770. The embankment would benefit the land shut out from the river, but might not it be to the injury of the land above?—It might throw the water more on the other side of the river.

1771. Is it in your opinion desirable that any enclosure of that kind should be made as a whole throughout the length of the river, and not partially—here and there only?—It appears to me right it should be so, but as a landowner I should be careful in joining others except local landowners in such a work. I should be almost afraid of too much being done, and of the whole thing being done too expensively.

1772. Supposing it were all done with as good management as possible, do you not think it desirable that it should be done as a whole?—Yes, I think it is.

1773. If it were so done, are you of opinion that the landowners on each bank of the river would be willing to pay a rate in order to keep the river in proper repair?—If I were a landowner I should be careful in joining a large undertaking like that; but I think that the landowners themselves, if they joined together and were to go into the question, might do a great deal more with a small outlay. My impression is that the landowners or their agents have not sufficiently looked into these matters.

1774. Are you aware that the land which is subject to flooding is seriously injured by it?—It is injured seriously if the flood comes upon it in summer time.

1775. Was your land subject to summer floods through the flashes let down the river?—Not that I am aware of.

1776. Do you know of any instances in which there has been injury done to the produce of the land in consequence of such flooding?—I have heard of hay being actually washed away by summer floods, but not by flashes.

1777. If the work of embankment were carried out as a whole the river would afterwards require regulating, because there would be more water contained within its banks?—Yes.

1778. The water would run with greater velocity, and would require management?—Yes.

1779. Do you not think that it should be put under some control, and that the landowners whose land was benefited on each side, should pay for the regulation?—Yes, that seems fair. I think the control should be local, assisted by a National Board on rivers.

The witness withdrew.

Mr. James Napier (agent to the Duke of Marlborough at Blenheim) examined.

Mr. J. Napier.

1779*a*. (*Chairman.*) You are agent to the Duke of Marlborough?—Yes.

1780. What property under your management is affected by the Thames?—Some land a little above the part Captain Dashwood has been speaking of, a little higher up, between that and Ensham, and about Ensham; there is land likewise affected in Oxford meadows between the railway and the waterworks, and there is some land lower down in Wolvercott alongside Port Meadow also affected.

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1781. Is any of your land liable to flooding by flashes as well as by ordinary floods?—It is flooded by ordinary floods, and also by flashes.

1782. Are any of the lands under your management embanked?—None of them.

1783. Have you contemplated at any point forming embankments to keep the river out?—No; the work could not be done there, as it is done higher up at Newbridge.

1784. You could not get an outfall without bringing the water almost to Oxford?—Not without bringing it almost down to Wolvercott.

1785. Could you then get a fall?—Yes.

1786. What difficulty is there in the way of doing it?—Taking the water so far and through so many different proprietors' lands.

1787. What is the effect in value upon the duke's land from this flooding?—It would be injured, I should say, speaking moderately, more than 10*s*. an acre; not the whole of it, some may be more and some may be less.

1788. Do you know of any injury having been done to the crops of farmers in summer time from flooding?—Yes.

1789. We have been informed by Mr. Alderman Towle, who has some land lower down the river subject to floods, that if he puts his young stock on to the land at this time of the year they are subject to the black-leg, and that he has lost several?—I should think that they might have that disease on other land as well, but there is no doubt that low-lying land is very detrimental to the health of young stock; it is almost impossible to rear them upon it, and more particularly land which is subject to flooding; but stock are subject to blackleg on highlands also.

1790. What is the effect upon sheep, suppose you put a flock of sheep upon the pasture in the summer time?—In all probability it would rot them.

1791. Do you think that if the water could be kept off, the land would be improved to the extent of 10*s*. an acre?—Yes, quite that I think.

1792. (*Professor Way.*) What is the average rental of the land?—I really do not know, but not above 2*l*. or 3*l*. I let some land at Cassington at 35*s*. that was subject to flooding, and some land that was not so subject I was able to let at 3*l*., but that might be an extreme case. I do not think that that would be borne out in every instance.

1793. (*Mr. Harrison.*) The way to farm such land as that would be to mow it as much as possible, would it not?—Yes, decidedly so; but still if it is not wholesome land for grazing, after the hay is mown the value is reduced very much, and then besides that, in the case of all land that is subject to flooding, the hay is of very little value, comparatively speaking.

1794. That one cause, flooding, leads to a continual diminution of the value of the land?—Yes.

1795. The flooding keeps the stock off, and the stock being kept off the farmer is obliged to make hay, and by making hay frequently the quality of the grass is injured, and the whole thing comes to wrack?—Yes, the water being always upon the land sours it, and the land grows only some aquatic grasses of very little value as food for cattle.

1796. What remedy have you to propose with regard to the Duke of Marlborough's land which is so situated?—Something should be done to allow the river to flow more freely.

1797. (*Chairman.*) There are impediments put into the natural stream which keep the water up higher than it ought to be?—Yes.

1798. (*Mr. Harrison.*) Does the bed of the river silt up?—Yes, it does.

1799. Are any steps taken to remove that silt?—Not that I have heard of.

1800. Does the Duke of Marlborough take no steps?—He has never done anything since I have known him.

1801. Does he own any of the locks or fishing weirs upon the river?—No locks, nor any fishing weirs, but he owns that small canal which goes up from the river to Cassington; that is his entirely.

1802. Does not the formation of that canal rather hinder the drainage of the land?—No.

1803. The canal is kept up at the same level as the river?—Yes, the canal would keep up the water to a great extent if there was no lock.

1804. Still the formation of the canal tends rather to dam the water still further back?—Yes, it has a tendency that way certainly.

1805. What grounds have you for saying that the bed of the river has been raised by the silting up?—I can see accumulation of mud in different parts.

1806. You know from observation that mud has accumulated?—Yes.

1807. So as to raise the bed of the river?—Yes, decidedly so.

1808. And no steps have been taken to your knowledge, either by the mill owners or the Navigation Commissioners to remedy that state of things?—I am not aware of any.

1809. The consequence naturally is that the Duke of Marlborough's land is more subject to floods than it was?—Yes.

1810. (*Professor Way.*) What length of river bank has the Duke of Marlborough?—Perhaps a couple of miles.

1811. Is there much encroachment upon the banks of the river over those two miles?—A little, not much; the water is rather dead, that is, it is slow running.

1812. (*Chairman.*) It is a deep pool there, is it not?—Yes.

1813. Are there any flams?—Yes.

1814. Are there such formed upon the duke's property?—Adjoining it.

1815. Have you taken any steps to check these flams?—Nothing has been done.

1816. Are you aware that sometimes they are allowed to increase?—I am not aware of that.

1817. Does the Evenlode bring down much silt?—I have no doubt that it does.

1818. Has the Duke of Marlborough any property on the banks of the Evenlode?—Yes, a good deal.

1819. And a mill?—Yes, one mill.

1820. Do the millers take any steps to clean out the Evenlode above their mills?—No further than by cutting the weeds.

1821. They do not let the water down in summer time and clear the pond out above them?—I have not known that to be done.

The witness withdrew.

Mr. R. Treadwell.

Mr. Richard Treadwell (of Ensham Bridge) examined.

1822. (*Mr. Harrison.*) Are you the lock-keeper at Ensham?—Yes.

1823. Is it a pound lock?—No, it is a weir.

1824. Do you keep any other weirs besides that weir?—I take the tolls of the pound lock for the commissioners up at Pinkhill lock.

1825. How far is that above Ensham?—It is a mile and a half from my house to Pinkhill lock. The weir I have is called Bowles weir in some of the maps, and it belongs to Lord Abingdon.

1826. How many years have you been at Ensham?—About 50 years altogether. I have only rented the place for 32 years, but I looked after it before that time.

1827. Do you pay a yearly rent to Lord Abingdon for the weir?—Yes.

1828. How much do you pay?—35*l*. a year; but then for that I have about 12 acres, and a house, and a right of fishery, and the tolls at the weir.

1829. What may be the value of the fishing?—Not much; I have kept an account of it, and it is about 13*l*. or 14*l*. a year. The fishery does not extend above a mile and a half or a mile and three quarters.

1830. Does it stretch down from Pinkhill weir?—Yes, to Ensham weir.

1831. Do you sometimes keep back the water for the flashes?—I always keep it back in short-water time.

1832. Is that under the direction of the Commissioners?—No.

1833. Do you do it without their directions?—Yes.

1834. Are you paid anything for keeping it back?—I am paid for drawing it, not for keeping it back. If any Oxford men want a flash they come up there to fetch it.

1835. Who are the persons from whom the bargemen purchase the flashes?—They purchase them from me. I receive *3s. 3d.* if they come for it, if they do not come I ask nothing at all.

1836. Is that on the regular flash days?—Yes, on Mondays and Thursdays, those are the flash days at our place; but the bargemen do not come always.

1837. Do you get that sum from each of the boats, or is the *3s. 3d.* divided among them?—*3s. 3d.* is our charge, no matter how many boats there are or how few.

1838. Do you ever pen back the water for flashes at other times except on Mondays and Thursdays?—It takes a day or two to pen the water ready for the next flash in short-water time.

1839. Do you ever let flashes out excepting those that you are obliged to give?—Yes, very often, for other people working from the canal.

1840. Are you paid for those flashes?—The regular flashes have nothing to do with them; when I draw for people working in the canal every boat is paid for; if there are two, or three, or four, or five, I receive *2s. 9d.* apiece for each. Those are the upper bound boats, and most likely are going to Ensham Port or Cassington Port; but I do not draw for this kind of flash very often.

1841. Is the letting down of those flashes disadvantageous to some of the millers below?—Not a bit of it; we cannot do without letting a flash down for the boats. I must draw the water in order to fill the next reach, else there would not be water enough.

1842. Have you a right to do what you like with the water?—Yes; I always have done it, and I have never had any interruption.

1843. That is to say, you may pen the water back and let it out when you like?—Yes.

1844. Have you ever let it out so as to flood the land below?—Never; we never get a flash like that.

1845. We have heard that land has been flooded so that hay has been carried off?—Yes, but that is a flood after heavy rains, not from a flash in drawing a weir.

1846. Alderman Ward has stated that he has purchased and brought down flashes which have injured the hay of the farmers?—The flash that we draw never really injures any farmer's land nor goes anywhere near it.

1847. Have you known the high-water marks altered at any time?—Yes.

1848. Where was that?—At my weir.

1849. By whom was that done?—It was done by Mr. Treacher the Commissioners' servant some years ago.

1850. How much did he raise the high-water mark?—About 2 inches.

1851. What was the object of raising it?—The water when at high-water mark was hardly high enough to allow boats to clear themselves from the upper weir on account of the sandbanks, and yet we were liable to a penalty if we let the water ever get above that mark; so Mr. Treacher put the high-water mark about 2 inches higher; but there was no detriment to the land even after that.

1852 Do you know whether the bed of the river in the neighbourhood of your lock has been silted up?—Yes, in a good many places.

1853. In a return before me you state that the river in places is only 2 feet deep and in others 12 feet deep?—Yes, that is, taking the levels in low-water time.

1854. Have you known of anyone taking steps to reduce those hills in the river?—No; there has not been anything ballasted out of the river I should say for 40 years. There used to be some of the Commissioners' men who took out a load or two of gravel in some places and put it on the towing-path to repair it.

1855. About how many years have the railways been opened so as to affect the trade upon the river?—The Great Western Railway I suppose has been opened for about 12 or 14 years.

1856. Was the trade on the river before that time very good?—Yes.

1857. Then for a period of 28 years, when the trade was at its best, there was nothing done to the river?—Very little was done then.

1858. How many boats do you now pass through your weir?—One a week.

1859. How many boats used you to pass when the trade was considerable on the river?—We used to get a trade from Gloucester, from Bristol, and from Brimscombe Port.

1860. How many barges would you have had at that time?—We had about 4 regularly working to Oxford with coals from the Forest of Dean, and then there were other boats that brought corn from Gloucester, oats, barley, wheat, beans, Egyptian wheat, salt, iron, copper, groceries, and various other things, manure sometimes, and oilcake.

1861. How many boats a week might you have had then?—I think we had about 4 or 5 a week upon the average.

1862. Not more than that?—Not upon the average.

1863. At the present time you say you have only one?—Yes, but the boats do not come out of the west country now, any of them. We have not had any out of the west country for 10 or 14 years; the boats that work now go up the river, out of the Oxford canal, to Newbridge, where there is a wharf, and it is very seldom tha tanything goes further than that.

1864. Are there not many boats that come out of the Thames and Severn canal?—No.

1865. There is now a railway branch made to Witney?—Yes.

1866. How does that affect the traffic on the river?—It knocked off one boat that used to work up to Newbridge and made about 20 trips in the course of the year.

1867. You say that the river is silted up, is there much land on the banks of the river about you that is subject to flooding?—Yes, a good deal.

1868. Is it more subject to flooding now than before the river was so much silted up?—No, it is just about the same.

1869. The flood does not come over the banks any sooner than it used to do?—No. Since there have been some alterations made up above we find the water is a day sooner; they have been making embankments about Lechlade and Buscott.

1870. Do you think that that forces the water down more rapidly?—Yes, and even at Stanlake there have been some wide ditches dug up, and enclosures made. I do not think that we get half the floods we used to get 30 or 40 years ago, that is, not so high and not so long in duration.

1871. But they come down more quickly, do they not?—Yes, very quick, and they are very quick off again, more so than they used to be.

1872. Can you give us any exact information as to that?—I believe that the ditches which were made about 10 feet wide is the cause of the change. The water runs off the land quicker into the river, it is in and out in a day or two. I have known a flood last for six months at a stretch without varying but very little. Where I live now it does not last above two or three days, or from that to a week, unless there is continual rain to cause an extra flood. The highest flood that I ever knew at our place happened about 40 years ago.

1873. Have you seen a flood come down the Windrush or the Evenlode while you have known the

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Thames?—Yes, I have known a flood from the Evenlode without our being flooded at all—it almost staggered our water there, that flow of water did.

1874. So that the tendency was almost to run up? —Yes, the Evenlode water brought the water of the Isis almost upon an even level with its banks without running over much.

1875. What is the bottom of the river about Cassington?—It is a clay or gravel bottom. After you get to Cassington lock stiff clay commences where you see a small cut on the map there.

1876. But above that towards Pinkhill?—Gravel, until you get above Skinner's weir, and then it commences to be clay again; as you go farther up, at Newbridge you get on gravel again, which continues up towards Rose's weir.

1877. Within your recollection has the river interfered much with the banks in washing them away?—Very little. It is about the same as it always was; it gives and takes; our river is very serpentine.

1877*a*. Does it take much away?—Nothing that you could observe in 20 years. You would hardly miss anything in one way, or see what had accumulated in the other. There are places forming now, but they are chiefly under water.

1878. Are there any flams in the river near you? —Yes.

1879. Have you known any of those rise at last into little islands?—Yes, but not about us.

1880. Whereabout have you seen them?—There is one down between King's weir and my weir. There is a little island formed there at a place called Hagley Pool Bridge.

1881. Within what time has that been formed?—It has been forming for years. There are a few osiers planted upon it now.

1882. Who planted them?—I cannot say.

1883. That is near where a branch turns down to the Wytham mill?—Yes, close by.

1884. Have you known owners of land plant withies and different things to encourage the growth of flams and encroachments on the river?—Not near to me; but I have known instances further up where fishermen have done so. Where they claim a right of planting they have done it.

1885. During floods is there much difference in the level of the water above and below your weir?—Our weir is nearly level when it is all open at high-water time; there is very little fall there.

1886. How is it at the pound lock?—There is rather more fall there. That weir is not so wide as mine by 3 or 4 feet.

1887. What is the size of your weir when all is cleared away?—13 yards.

1888. What height would the flood passing through it be from the sill?—It would be about 6 feet then.

1889. Is that the whole of the space that the water has to flow over?—No: when it is flooded it runs over and across the meadows in very many ways.

1890. What depth is the water over your weir in dry weather when it is all open?—I can run the water down to about five or six inches on the sill if I let it run a good while. I could not get the water lower than three feet when there is anything like water in the river.

1891. How much fall is there over the sill?—There is nothing perceptible, no more than a sharp stream.

1892. All the water in that case must go through your weir and not at the side?—Yes.

1893. Is the land that is flooded in your neighbourhood much injured?—Not a bit of it; the flood improves it. Indeed one never expects to get a crop there without a flood. The land, especially if we can get a good thick water over it, will produce some good crops of grass. But it does not do for cattle to lie about on except in a very dry summer.

1894. At this time of year, if you put cattle on, what would be the consequence to them?—They are generally all shifted in the month of November, as soon as the land gets wet.

1895. Will the grass in summer fatten a bullock?—Yes, and sheep or anything else. I have known cattle to die with the blackleg there.

1896. At what time of year might that occur? —At all times. It is supposed that it is through their thriving too fast—that the quality of the land is too good for such young things.

1897. The disease generally takes off the best animals in point of health?—Yes. I have had one that looked as well as it could and in three hours it was dead; but I never knew any instance of sheep rotting about there.

1898. Have you ever put them on at this time of the year?—No, not at this time of year; they are generally all off in November. Sheep have been on the land there until the last fortnight or three weeks.

1899. Is there any further information that you think you can give the commissioners that will be useful to them?—With regard to flashes, I may state that in 1862 I drew 6 flashes for the 12 months.

1900. Besides the ordinary flashes twice a week? —No, all six of them were those Oxford flashes, as we call them.

1901. But you must send a flash down, must you not, twice a week?—No, only in very short-water time. They come and fetch a flash and then they will wait three or four weeks before they come for another, and then they will come in a fortnight for another, and so on. Those are the flashes that I draw to send to Oxford to carry the barges on from Oxford down to Abingdon and Wallingford. I only drew 6 flashes in 1862 for 12 months, in 1863 I drew 24 flashes, in 1864 I drew 30 flashes, and this year I have drawn 9 flashes.

1902. How many flashes have you sent down to bring the boats up?—Nothing ever comes up that way. The boats can come out of the Oxford canal by Duke's lock into the millstream that comes down at Wolvercott mill and out again into the river at King's weir, up to Cassington lock, without any flash, if the water is as low as it can be. The water on the head of the mill generally keeps up enough to float boats up to there, and then I draw the water to send them up to Ensham wharf.

1903. How often do you run the water off for fishing?—That is just as it happens. We generally put the nets into the river after the rains in thick-water time. That lasts sometimes for a week, and may be a fortnight. After that we let the water all run over.

1904. What weight of eels have you ever caught in a year?—I should expect that I catch about 1 cwt. in a year, there are very few taken.

1905. Is that all?—Yes.

1906. Are there any fishers on the Thames who catch more than you do?—Yes; further up at Skinner's weir they catch a great deal more, they catch there about 4 cwt. or 5 cwt. of eels.

1907. Weighing, I suppose, from 1 lb. to 2 lbs. or 3 lbs.?—Yes, from $2\frac{1}{2}$ lbs. to 3 lbs. and 4 lbs., but $2\frac{1}{2}$ lbs. is something like the average weight.

1908. What would be done if there was a shallow place over these hills of which you have spoken, so that barges could not get along?—All that they can now do is to get a flash from the next weir to carry them over, but it used to be done by some men who came and ballasted those hills out.

1909. But nothing has been done you say for 40 years?—No.

1910. To whom does the towing-path belong?—To Lord Abingdon.

1911. Does he receive anything for it?—No, and never did.

1912. When the river has encroached upon the bank what is done with the towing-path?—There is no particular towing-path, you go anywhere how you can; the river is very serpentine and you cannot keep close to the bank.

1913. Have you known any case in which the river has been encroached upon so that the towing-path has been moved further in?—Yes; but you hardly see in the space of 20 years the bank move a foot or 18 inches; but the river appears to me to-day to be as

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nearly like what it was 50 years ago as can be. Since I have known it the washing away is almost imperceptible, it has not taken anything like a quarter of an acre or half an acre away, that you can see; there might be places forming as wide as this table is, here and there, but in a year or two they will disappear and the bed will form somewhere else; the river seems to keep in the same bed as ever it did.

1914. By King's weir the water goes in one direction down to Wolvercott mill, and in the other to Wytham mill, is there no weir to regulate the water going to those two mills?—Nothing more than an open stream; almost all the water is now sent from King's weir through Wolvercott mill; there is hardly any water below there until you get below Godstow, unless in flood times.

The witness withdrew.

Adjourned till to-morrow at 10 o'clock.

Oxford, Tuesday, 7th November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

Mr. JAMES CASTLE examined.

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1915. (*Chairman.*) You are engineer to the Thames Commissioners?—Yes, I am called General Surveyor.

1916. Is the evidence which you gave before the Select Committee of the House of Commons, in May 1865, a correct statement of your opinions upon the various points?—All, with the exception of the portion of the evidence which relates especially to sewage—that is, from question 672 to question 682. It is there stated that the whole of the sewage of the places there mentioned passes into the river, and I wish to say that it is only some of it which so passes, but how much I cannot say. I should wish now to call the attention of the Commission to several questions which have arisen, and which the present Acts of Parliament do not appear to meet. Starting from Lechlade, the first point which appears to me to require attention is a place where the towing-path immediately above Lechlade Bridge has been washed away. One of the first duties which I was called upon to perform after my election was to repair this towing-path, and to make it of sufficient width to allow a waggon to pass into the field beyond. The path has now been reduced to 4 feet in width in consequence of washes. That is wide enough for a horse to tow upon, but the owner of the land who is a barrister, called upon the Commissioners to restore a waggon road. This case affords, perhaps, a better illustration as to towing-paths than any other which may be found along the whole length of the river, because on the land side of the path there is a very deep ditch which in flood times carries a considerable quantity of water. Now, the ordinary practice of the Commissioners, whenever a towing-path is washed away, is to take from the land a sufficient quantity to replace it; they do not make up the banks. In this case, however, in consequence of the ditch being on the land side, they could not take the path from the land.

1917. They would have had either to restore the bank of the river or to pass over the ditch and take land beyond, or to fill up the ditch and alter its course?—Yes.

1918. How did the Commissioners settle that question?—The question still remains; but the Commissioners did nothing, acting on the advice of their general clerk, that it is not their duty to replace that path upon the river side. I believe that the Acts of Parliament are not at all definite upon this point—in fact, I believe that there is hardly any allusion to a case of that kind. Coming down to the town of Lechlade, there is still a considerable traffic on the river; in fact, the whole of the heavy goods and almost all the traffic to and from Lechlade come by water; there is no railway near Lechlade, and the maintenance of the navigation to that point is a matter of very great importance to that town.

1919. What is the population of Lechlade?—I should think about 3,000.

1920. (*Mr. Harrison.*) Which way does that traffic go?—It comes down the Thames and Severn canal. The navigation to Lechlade from the Thames and Severn canal depends very much upon the lock at St. John's Bridge being kept in a good state of repair.

1921. Is that the entrance lock from the river into the canal?—No, it is the first lock upon the Thames. It will be seen by reference to the map that traffic coming along the canal to Lechlade pays no tolls to the Thames Commissioners, and this lock, upon which the navigation to Lechlade very much depends, is below Lechlade Wharf and below the town; it is now in a very dilapidated state, and does not perform the duties which are required of it. At a short distance below St. John's lock the river Leach enters the Thames, and from the tail of St. John's lock there is a canal, and upon this canal the lock itself is placed, it is a short cut. When I examined this cut last April I found that it was reduced in width to 13 feet only.

1922. (*Chairman.*) From what?—33 feet. There are 20 feet of width of waterway entirely lost below the pound lock, and this growing up is in the navigable channel.

1923. The growing up is from what cause?—From a deposit being left there after every flood, and from the owner planting that deposit with osiers. The depth of water last April, when the stream was in a very good condition, was a fair example of the average depth; it was then only 2 feet. The depth formerly was perhaps 6 feet. From St. John's pound lock to Buscot pound lock the depth of water in many places is not more than 2 feet, and it was formerly of a sufficient depth for boats of 160 tons to navigate.

1924. What water would they draw?—4 feet.

1925. Then the river has lost one half its depth?—It has lost rather more than one half its depth. Buscot lock is now in a state of utter ruin; at least one-third of one of the lower gates is entirely gone, and in addition to that the pound itself is almost entirely grown up with the American weed. The next point to which I think it is necessary that your attention should be called is the fact that between the two weirs, Hart's upper weir and Hart's lower weir, Mr. Hart, the owner of the two weirs and of the fisheries, considers that he has a right to all islands and deposits which may be formed in the river. Last April an island was pointed out to me by an old workman upon the river which the man recollected to have been a mere speck; it is now an island some yards in extent and is planted with osiers. Immediately below this island, at a place where a deposit forms after every flood, I saw a canal barge sunk in the middle of the river and almost in the channel. I inquired who placed the barge there, and the answer of Mr. Hart was that the barge had sunk there by accident and had never been removed; but I saw that all round this

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barge and in the centre of the barge a deposit was collecting, which in a very short time will form the basis of a considerable island in the river and almost in the navigable channel.

1926. And you, as General Surveyor to the Thames Commissioners, had no power or authority to remove that barge?—I had no authority, and at the time when I saw it the Commissioners had no funds which would have enabled me to remove it. The next pound lock is at a place called Rushey. The gates of this lock can only be opened with great difficulty by attaching a horse by a stout cord or chain to them. The lock is placed upon a short cut; and the entrance to this cut is now so grown up that it is utterly useless for navigable purposes, and the lock itself is very inefficient. At this place there is another point which deserves attention. For very many years the public have used the stages of the lock as a footway, and I have received notices from farmers and others residing in that neighbourhood that the stages of the lock were in a very dilapidated state, and ought to be repaired. Thus a question of right of way has arisen; it is a question of usage, perhaps.

1927. There are projecting planks put on the top edge of the lock to enable persons to pass over?—Those planks are simply placed there for the lock keeper to draw his paddles and to work his gates.

1928. But they form by usage a footway?—Yes.

1929. (*Mr. Harrison.*) Is there a weir beside?—Yes, and there is some right of way over that too claimed by persons residing in the neighbourhood.

1930. Is there a similar planking?—There is a similar stage.

1931. (*Chairman.*) You generally have a foot-staging across your weirs to enable you to get from one bank to the other?—Yes, and to draw the tackle of the weirs. From St. John's lock down to Tenfoot weir an embankment has been thrown up on each side of the river by the landowners. Exactly at this weir the embankment has been brought in so close that the only floodway remaining is about 35 feet in width between the two banks.

1932. What height are the banks?—Between 3 and 4 feet. At present the embankment on one side has not been carried down quite so far as on the other, and the farmer at that point, who is a tenant of Sir Nicholas Throgmorton, makes very strong complaints of the manner in which the flood water is sent over his land opposite this enclosure. In my opinion these embankments of landowners have all been constructed simply for their own purposes to keep the flood off their own lands, and not upon a general plan, with special consideration as to waterway. At Duxford the farmers complain very much indeed of the manner in which the flood now comes down upon their land in consequence of these embankments. These embankments will bring down the flood water upon Oxford very much more rapidly than has been the case hitherto, and I consider that that is a matter of such great importance that it ought to receive attention in any future legislation with respect to the river. I believe that at present the Thames Commissioners have no power whatever to interfere with those embankments, and it is considered an open question whether they have power to interfere even if an embankment is placed upon a line of the towing-path. The bargemen rather wanted to have the embankments because they serve to lead horses upon in flood times. At a lower point near Tenfoot weir on the Buckland Meadows some attempts at irrigation have been introduced; that is almost the only instance that I know of along the whole length of the river.

1933. You mean irrigation by river water?—Yes.

1934. (*Mr. Harrison.*) Have those attempts been successful?—The tenant tells me that they have been successful far beyond his expectations. The next point which may be considered is the wharf at Newbridge. This bridge crosses the river and forms part of the main road leading from Witney to Abingdon, and the wharf is the point to which traffic from the Oxford canal passes up the river.

1935. You say that there is traffic from the Thames and Severn canal downwards to below Lechlade?—Yes, occasionally down to Newbridge, but the passage is made with such difficulty that it is very rarely attempted. The next lock on the river belonging to the Commissioners is Pinkhill lock—that is now quite inoperative, the gates are opened with very great difficulty by attaching a horse to them. When I passed on making my survey the horse which was drawing my boat was attached to the gates and pulled them open, but the cord broke several times, and I passed through with the greatest difficulty.

1936. Are there no weirs?—Yes, there are several weirs, but they are not the property of the Commissioners. I handed in, during the examination of a witness, an account of these, and a statement of the rents of some of the fisheries. The next point below Pinkhill lock to which your attention should be called, is King's weir. King's weir is a weir belonging to Wolvercot paper mill, and is placed across the navigable part of the river. Persons wishing to pass through King's weir have for years past found considerable difficulty in getting the weir open. I believe that the owners of Wolvercot mill claim the right to close that weir except on flash days; occasionally persons are allowed to pass, but as a general rule the weir is closed against them, and in consequence of that weir being closed and kept tight very little water indeed passes from that point down to Godstow, and along the whole of that distance the river is in a most disgraceful condition; generally in summer a person might almost walk across anywhere in that reach, except in the pools. At Godstow there is a cut and another lock belonging to the Commissioners. That cut is now almost grown up, and although a considerable flash might be sent down it from King's weir, it would not be of sufficient depth to float a barge containing any cargo. I hardly think that it would float a barge containing six tons. Godstow lock is in a very dilapidated condition, and may be considered as entirely disused. At Lechlade there is a fishery of considerable extent, but I have not been able to ascertain what rent is paid for it nor any approximate estimate of its value. At Hart's upper weir, Hart's lower weir, and at Rushey weir there are fisheries. At Rushey the fishery and house and 10 acres of land are let for 30*l.* a year. At Tadpole, which is the next weir, there is a fishery. This fishery extends for three miles, half stream only, and with the island in the pool is let for 10*l.* a-year. At Old Nan's, the next pool above Rushey, there is a fishery. At Tenfoot weir, which is the next below Tadpole, there is a fishery, which is let for 5*l.* 10*s.* per annum—that fishery is 150 yards in length and in the rental are included two cottages.

1937. Do those fisheries of which you are speaking act as weirs as well as for penning water back for flashes?—Yes.

1938. Are the keepers of the weirs entitled to levy tolls for flashes and for passing boats?—Yes.

1939. Is the right to levy those tolls included in the rental?—Yes; the toll in most instances is simply a nominal sum for drawing the weir tackle. In most cases the charge, I think, is 1*s.* 6*d.* for a canal boat, and 1*s.* or 6*d.* for a pleasure boat. At Duxford there is a fishery which is let with the farm, but the owner of the fishery estimates that he pays about 12*l.* for it out of his total rental. At Rose's, which is the next weir, there is a fishery which belongs to Magdalen College, and the rental of that is 13*l.* a-year. At Ridge's, or Hart's, or Granny Cox's weir, there is another fishery belonging to St. John's College, of that you have had some evidence from Dr. Adams. At Skinner's weir, which is the next below, there is another fishery. This weir is called Langley's or Skinner's weir (Noah's Ark weir near it is an old disused one). Skinner's is a weir of some importance, it being now the point from which the flashes are brought down for the navigation below Oxford. Flashes are now practically abandoned above this

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point. I believe that for the last 10 or 12 years on not more than one or two occasions have flashes been brought down from Ridge's, which is the weir above Skinner's weir.

1940. We found them keeping up flashes at Lechlade ?—Yes, but they are not brought down to Skinner's weir. Perhaps when a boat has to pass down to Buscot wharf, or Newbridge, there may be a flash used so far, but flashes do not come down regularly from Lechlade. But although there are no flashes, the water is sent down from these weirs generally during the night, when large frames with network to them, called bucks, to catch eels and other fish, are inserted in the weir instead of the shutting tackle. There is another fishery at Bold's weir, or Ensham weir, upon which you had some evidence from a witness yesterday.

1941. (*Professor Way.*) What is the value of that fishery ?—I have no information on that point. There is another fishery at Godstow.

1942. (*Mr. Harrison.*) There was a little confusion yesterday with regard to the flashes sent down from Ensham weir ?—Yes ; the common practice has been with the people at Wolvercot mill to work the flash through their mill, and not through King's weir. The flash ought to be run through King's weir, and the mill ought to be stopped for three hours, or till the water has risen to the high-water mark.

1943. Now, however, that there is no navigation except through the short cut to the canal, I mean no navigation to Godstow, the water, instead of being sent down the navigable channel, is taken to Wolvercot mill ?—Yes.

1944. So that it is to the interest of Wolvercot mill to have that old navigable channel stopped up ?—Yes.

1945. As it is being stopped up ?—Yes.

1946. It is being silted up ?—Yes.

1947. (*Professor Way.*) Will you follow the river down with the fisheries ?—The next is at Godstow.

1948. That is below King's weir ?—Yes.

1949. (*Mr. Harrison.*) Is that on the navigable channel ?—No. Exactly at that point a cut has been made which I have spoken of before, which is now almost grown up. I have heard a statement made by a witness since you have been sitting here to the effect that the reach between King's weir and Godstow pound would be filled with water if Godstow pound were put into good repair. I may say that that statement would be true if the fishery were not used at Godstow, but as that fishery is very frequently used the reach would be run dry by that weir although the pound might be put in good repair.

1950. (*Professor Way.*) Is that the last fishery above Oxford ?—Yes ; then when you come to the waters at Oxford the freemen of Oxford claim a right of fishing.

1951. You mean fishing by net ?—Yes.

1952. (*Mr. Harrison.*) Throughout the whole of the district from Lechlade to Oxford the river passes over the Oxford clay ?—In patches only. I have no doubt that the subsoil for some depth would be clay, but the bed of the river is principally gravel.

1953. Over that length the river receives several tributaries—the Churn, the Evenlode, the Windrush, and others ?—Yes.

1954. Do those tributaries bring down with them any considerable amount of silt during floods ?—The Windrush does.

1955. We had it in evidence yesterday that the river in the neighbourhood of Ensham was silting up considerably within the recollection of the witness ?—Yes.

1956. Are you conversant with that fact ?—Yes, that is at the mouth of the Evenlode, and that silting up continues for some considerable distance down towards King's weir.

1957. Throughout the district the river is exceedingly crooked, is it not ?—Yes.

1958. Did that crookedness arise from the river having to carry this silt and depositing it in shoals, and from those shoals when deposited forcing the river to the banks from side to side ?—Yes, no doubt of it ; that is the present action of the river, but it is to some extent modified by the weirs.

1959. The introduction of one of those weirs lessens the waterway at the weir ?—Yes.

1960. What is the effect immediately below the weir upon the bed of the river ?—Immediately below the sill of the weir there is generally a very deep hole, and immediately below that a corresponding hill, and as a consequence the water having to make its passage round the hill washes away the banks on either side of the pool. Only comparatively a very small quantity of water is discharged over that part of the bed of the river which lies straight below the weir.

1961. So that the introduction of those weirs into the river tends to the formation of shoals ?—Yes, undoubtedly.

1962. What would be the effect of those shoals upon the flooding of the adjacent land ?—They would throw the flood out very much more than if the bed were entirely free, provided that the pool banks did not wash.

1963. So that the effect of the weirs is to flood the land ?—Undoubtedly in some cases.

1964. Those weirs, I presume, were originally erected by the landowners adjoining ?—No doubt they were.

1965. So that it was the landowners' business to look after any injury occurring ?—Yes.

1966. Have you been aware of a case where the effect of building a new pound lock below a weir has been to pond back the water so high to the next pound lock up above as to render useless the intervening weir ?—You will see from old reports that that was the object of the pound lock, but I am not aware of any special instance.

1967. Is there a new pound lock at Shifford weir ?—No ; there was one once recommended, but it was never erected.

1968. Is there a new pound lock at Noah's Ark ?—No, the old weir there has been destroyed.

1969. Langley's weir still exists and is kept for flashes ?—Yes.

1970. How far is that above the new lock at Pinkhill ?—I should think that it is not more than a quarter of a mile in a straight line. It is something less than half a mile round the river ; the river winds very much there.

1971. Would the erection of those pound locks raising the water to that greater height have the effect of increasing the floods upon the adjoining land ?—Yes, certainly, unless there was a waste weir by the side of them sufficient to carry off the rising flood water.

1972. And is there generally a waste weir ?—Yes.

1973. I suppose that the level of that weir is raised coincidentally with the erection of the pound lock, so as to keep up the water to its required height at the lock ?—Yes ; that weir is a necessity, because it is not desirable to pass floods through a pound lock. It becomes difficult to open the gates afterwards, and the pound keepers have always to be cautioned with regard to passing a flood of any sort at such a time through a pound, as much gravel and silt come through.

1974. If the old weir is closed at that greater height and a flood or a flash comes down suddenly, what is the effect upon the adjoining land ?—There is a flood immediately, and floods are very suddenly occasioned by masses of weeds being allowed to float down the river. They gather at the weirs and pen the water to a greater height, and thereby cause flood. That is one of the most difficult matters in this upper part of the river with which the weir keepers have to contend. They frequently have to work two or three nights and days to cut away weeds entangled in the tackle.

1975. The original weirs apparently were erected by the riparian owners, but these new locks, which pen up the water higher and have the effect of flooding

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the land, were not built by the riparian owners but by the Commissioners?—Yes. I hardly think that it is fair to infer that the pound locks do pen the water higher than the old weirs. I do not know of any cases of that kind.

1976. For instance, take the case of Sandford, it is stated in this old report that "Sandford lock, although "built, should be in like manner lengthened, and "made to pen over small shoals above, water ditches "being always in such cases made for the use of the "land." It involves the idea of raising the level of the water at Sandford lock, so as to pond the water back to the lock above?—Yes, there is no doubt that wherever a pound lock was introduced the attempt was made to get rid of a weir; it was probably because the weir was a great nuisance to the navigation. Still, if your question is, definitely, is the water penned up and thrown upon the land in consequence of St. John's, Buscot, Rushey, and Pinkhill pounds being built, then my answer is that I do not think that it is. I am not aware that those pounds throw out the water more than other weirs do.

1976*a*. The idea of some of the engineers of that date was that keeping the water up to the level of the grass was rather an advantage than otherwise?—Yes, and some few farmers still hold that opinion. I do not mean to say to the level of the grass, but to the roots of the grass.

1977. The object of the improvement was by placing pound locks at every other weir to make the reaches twice as long as they were before?—Yes.

1978. And, of course, where the pound locks were placed the water was raised so much higher?—Yes.

1979. When the water was let through those weirs after being pounded to that height would it not have a greater scour immediately below those weirs than it had before, when it was only pounded to half the height?—Yes.

1980. Consequently a greater hole would be formed? —Yes.

1981. And lower down a larger hill would be thrown up?—Yes.

1982. And that hill would cause a flooding of the land?—Yes; it would be apt to do it; but in every case the water in a weir pool washes away the banks considerably.

1983. This then is an injury from the pound locks to riparian proprietors?—Yes, indirectly it is.

1984. One can understand why the riparian proprietors might be called upon to remove the hills which were caused by their own weirs, but when you erect pound locks and cause a greater shoal below, does it not then become the duty of the Navigation Commissioners to remove those hills?—Certainly.

1985. Have they done so?—Not in the upper part above Oxford for many years.

1986. We, I think, had it in evidence yesterday that they had not done so for the last 40 years?—That may pass as a general statement, but they certainly have done something at a very much later period than that.

1987. You have mentioned the case of St. John's Lock, where the river which used to be 33 feet wide immediately below the lock is reduced to 13 feet wide, with a depth of only 2 feet instead of 6 feet, as formerly. Is that the result of the improvement of the navigation?—No, rather of the abandonment of the navigation.

1988. Has not the greater penning of the water for the purpose of the pound lock caused a deep immediately below the lock and made a shoal beyond encroaching upon the banks on either side and creating a flam in the middle?—That cannot possibly be the case there, because at Buscot, which is the weir immediately below, and at the pound lock immediately below the point of which we are speaking, the works are so wretchedly out of repair that they cannot possibly pen up the water even to the height necessary for navigation.

1989. What is the result?—I think, perhaps, that if that pen had been up to its proper height, and the water had been more still than it is, we should not have had the soil of the banks washing away, and then perhaps this formation would not have occurred.

1990. How do you account for that bank?—By the current being increased.

1991. And what has increased the current?—The pen being let down at Buscot. The islet of which I spoke is below St. John's pound, and the next pen is at Buscot.

1992. Still lower down?—Yes. The current and the fall are increased between St. John's and Buscot.

1993. But the current being increased would rather diminish the hill than otherwise?—It brings away a bank immediately below St. John's Bridge, and that bank is carried on to the opposite side and deposits at this place.

1994. The result has been that the penning of the water to a higher level by the introduction of the pound locks has caused a great hole immediately below, and a great hill at a little distance down?—Yes, but in my opinion the penning of the water and the control of its flow acts very beneficially between the pounds—the wash upon the bank is not so great.

1995. The embankment on the Oxfordshire side by Rushey Lock has caused the adjoining lands of Sir Nicholas Throgmorton to be flooded?—Yes, near Tenfoot Weir.

1996. Then do you anticipate that the formation of the embankment below Newbridge will have a similar effect?—Undoubtedly.

1997. And that it will send the floods down to Oxford more rapidly than they have come hitherto?—Yes, when the opposite side is embanked.

1998. Have you any good plan of the Thames at this part or at any part of the river?—Not drawn to a large scale.

1999. Is there no such plan to be seen?—I believe not.

2000. It seems to have been the complaint of the engineers in 1790 that there was no such plan, and that appears never to have been remedied?—Yes, and the complaint is still made.

2001. Are there no sections of the river?—No; the only levels that I have been able to procure are some which I have compiled from Bradshaw's map of the navigable rivers and canals of England; those I have corrected to some extent; for instance, I have ascertained as near as possible the actual fall at the locks now working, and I find that generally they correspond pretty much with those levels.

2002. Have you the level from lock to lock?—Yes, I have made out a general table from those levels.

2003. Have you corrected it by actual levelling?—No, I have not.

2004. What was the fall of the water from below Godstow lock to below Sandford lock?—I cannot tell you that, because Godstow lock was not constructed when those levels were taken.

2005. The fall has been taken, and it would appear that there is about 19 feet difference between the two locks from tail to tail, the distance is about 7 miles and 10 furlongs, giving a fall of about 2 feet 8 inches per mile?—The average per mile from Oxford to Abingdon is 2 feet 5½ inches.

2006. Is that taken from above Oxford?—No, that is from Osney.

2007. Then that does not very far disagree?—No.

2008. From that upwards to Rushey Lock I find the fall to be only 1½ feet per mile, or thereabout?—I have taken right through from Lechlade to Oxford, and there I have a fall of 1 foot 9½ inches.

2009. It seems to be rather steeper at the upper part?—Yes.

2010. Through Oxford it is something like 2 feet 6 inches per mile?—Yes.

2011. Considering that the fall is so considerable through Oxford, does it not appear probable that it is from mismanagement that the meadows are flooded as they are?—It does; there is no doubt that the evidence which you have had as to the penning at Sand-

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ford points to the primary cause of the flooding of this district.

2012. May this flooding be due to the penning of the water by the pound locks through Oxford ?—No, I think not.

2013. Why not ?—The only pound lock in Oxford is at Folly Bridge: there is a waste weir there constantly open, and in flood time the pound lock is thrown open.

2014. Quite open ?—Yes; there is a weir just above Folly Bridge; under the control of the person who works the old city waterworks mill; that is not always drawn, but when it is I think the waterway in Oxford is quite sufficient.

2015. Can you give us the area of the waterway at each of these locks ?—I cannot do that without referring to other papers.

2016. Perhaps you will be kind enough to furnish the Commission with that ?—Yes, I will.

2017. You see that the upper part of the river above Oxford has a very slight fall of 14 inches in a mile, and you give it us in evidence that there is brought down by the tributaries a considerable quantity of deposit or mud into this part of the river ?—Yes.

2018. What would be the effect of penning up the water by locks on the power of the river to remove that deposit ?—There is no doubt that the scour in the river is considerably lessened by the penning up.

2019. You have stated in evidence that the effect of the introduction of pound locks, as now constructed upon this river, has been, first, to scour any deep hole deeper than it was before and to form a bank at a little distance below the hole, and to increase the rapidity of the flooding upon the adjoining lands; and secondly, that by penning up the water the river has not the same power to remove the silt brought into it as it had before, and that consequently the bed of the river has silted up ?—Yes, and the only way in which I should qualify that is by saying that it is not the pound locks, but the weirs adjoining them, which are the cause; the water which passes through the paddles of the pound locks is inconsiderable, it certainly does cause a small depression in the bed of the river, but nothing at all compared to that caused by the water washing through the weir.

2020. The weir is raised, is it not, to accommodate the pound locks ?—Yes; but at the weirs in flood time all the tackle is removed, and the water rushes over the sill in a great volume.

2021. Do you know whether there is any scheme afloat for converting the Thames and Severn canal into a railway ?—I have not heard that.

2022. Is there not a railway being formed to Lechlade from Gloucester—the East Gloucestershire line ?—I think it is two miles away from Lechlade, but that is much nearer than the railway at Faringdon, which is six miles from Lechlade.

2023. If the Thames and Severn canal were done away with and a railway introduced, would there still be traffic to Lechlade on the river ?—No, certainly not, because the part from Cricklade down to Lechlade has been disused. Certainly it might be restored, and the river dredged and put in a navigable state, but I think it will never be worth the trouble.

2024. Might there be a trade restored from the Oxford canal up to Lechlade for the supply of coals ?—That I can hardly answer. I think it is possible that the East Gloucestershire Railway would bring the Forest of Dean coals so cheaply that the Oxford canal bringing coal from the midland collieries could not compete with it.

2025. You stated that there had been a question about a footway across the lock gates at Rushey Lock and across the weir ?—Yes.

2026. Did that footway exist across the weir before the formation of the pound lock ?—Yes, and at the Lock there was and is now a ferry, but I believe the ferry boat is hardly ever used. People pass over the lock in preference to taking the boat.

2027. You mentioned that a canal barge had been sunk below the flam at Hart's weir ?—Yes.

2028. Have you any reason to believe that that barge was sunk purposely ?—I have a very strong suspicion about it, but I have no evidence. If the barge had been sunk a few yards higher or lower an island probably would not have been formed there.

2029. As to the more rapid descent of floods, how far do you think that it is attributable to the drainage of the land, and how far to the embankments which have been formed ?—To a very limited extent I think to the drainage, because those works have not been carried out very generally.

2030. What is your opinion as to the maintenance of the upper part of the Thames. Do you think that the navigation should be maintained throughout ?—I think not. Looking along the banks of the river, and seeing in many cases the very desolate state of the country and the very scanty population, it would in my opinion be very futile to attempt to restore the river to a navigable state there. But at the same time I consider that no navigation can exist below Oxford unless the upper part is kept up in connexion with it, serving as a series of reservoirs for the supply of water. I consider that it is of the utmost consequence that the persons who have the management of the navigation down below Oxford should also have some control over the water in the upper part of the river. I think it is possible that the weirs we have been speaking of may many of them be readjusted, so far as the navigation is concerned. I have no objection to many of the weirs being removed. My object would be to store the same quantity of water as now.

2031. For what purpose ?—For the purpose of supplying the lower districts in dry weather—in summer time.

2032. Would you propose to use it for flashes as they do now ?—Yes. I certainly think, from what I know of the districts, where for a very long time flashes have been used, it would be hazardous to give them up at present.

2033. Do you mean to say that in putting the river Thames below Oxford into a thoroughly good navigable state you would continue flashes as part of the system ?—I should certainly continue them until I had had experience of one or two dry summers.

2034. Can you give the Commission any information as to the velocity of the water that is passed down by the flashes ?—No, I cannot. It would vary according to the construction of the weirs. The manner in which the boatmen profess to navigate the Thames is to ride on the crown of the flash, and if they do not catch the crown of the flash the flash is of very little use to them, and hence arises the great damage that is done to the river traffic when the millers will insist upon working the flashes through their mills. The flash sent down is an even sheet of water, just like a sheet of paper, which raises the level of the river perhaps half an inch.

2035. It is let out from the weir that is opened, and it passes along and over the adjoining reach in the form of a wave ?—Yes.

2036. The boats ride upon the crest of the wave ?—Yes.

2037. If the water is let through the mill it is let through gradually, and there is no wave-like motion of the water ?—Quite so, the velocity depends upon the conditions of the waterway.

2038. Is the pool where the flashes are let out from above the weir of considerable width ?—No, it varies, and is frequently very narrow.

2039. The reaches as at present formed appear to have been made by raising the water where the pound locks are placed, so as to back the water to the pound above; would it not have been a more desirable plan if the bed of the river had been dredged upwards towards the lock above ?—Certainly it would.

2040. In case of any renovation of the navigation would not that be a desirable system ?—In most cases it would, but not always. The case has been men-

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tioned of Caversham pound; after the sill of that lock had been lowered 18 inches the hill formed at the tail of the lock was dredged away and the result was that there was gained but 6 inches of water over the sill instead of 18 inches. Immediately below Oxford, opposite Radley Common, the same effect occurred; this I witnessed last summer. For some considerable distance I had the bed of the river there dredged, to perhaps something like 10 inches or a foot, but I found that nevertheless I did not get any more water. I find also from old reports that that has always been the case at that particular point; the fact is that the hill in the bed of the river holds up the water, and when you take the hill away the water runs more evenly, and so you gain nothing by the dredging.

2041. The hill in fact forms a kind of under-water weir?—Yes; I have proposed to place there an under-water weir right across the bed of the river except in the navigable channel.

2042. I see that some gauge weirs are mentioned in the reports of the engineers; do you know of any that are existing in the Thames now?—There is not one anywhere I believe.

2043. If you had gone on dredging lower down you would have got water perhaps?—I hardly think I should, because the fall is so great.

2044. If you lower the whole bed from the lower pound to the upper, you will lower the water upon the sill of the upper pound?—Yes; many years ago there was another lock at Newnham, and I consider it of the greatest importance that that lock should be replaced; there is a greater fall between Sandford and Abingdon than on any other part of the river.

2045. What kind of reach is it generally for depth?—At the point at Radley Common it is very shallow indeed, the water is kept close down to the bed of the river.

2046. Do you know why Newnham lock was removed?—No; I have endeavoured to ascertain; I cannot account for it, unless it was that the owner of Sandford mill had some influence and got rid of it.

2047. The removal of Newnham lock would be to the advantage of the tail water at Sandford mill, would it not?—Yes, and perhaps I may be permitted to say that if there should at any time be a lock placed at Newnham it will affect the outfall contemplated by the Oxford people for discharging their sewage; it would raise the water higher at the point where they propose to discharge their waste water.

2048. In any renewal of the navigation, would it not be very desirable that there should be fixed weirs at each pound lock, overflow weirs of a sufficient length, not weirs like the present that have to be opened out?—Yes, it would be very desirable that the waste weirs should be formed with special reference to the quantity of flood water they have to discharge.

2049. If they were of sufficient length and at a proper level the water would not rise above the surface of the land adjoining?—In most cases that would be so; the small floods might be kept completely under control, but the large floods and the water which comes down after much snow has melted will always overflow the land.

2050. If there were fixed weirs, would not that get over all the difficulties as between the millers and the landowners?—I believe it would.

2051. Therefore that should be an object to be borne in mind in any scheme for the improvement of the Thames?—Decidedly.

2052. And again, upon the other question as between the navigation and the millers, would it not be possible at the upper part of each of the mill streams leading to the mills to place a weir over which the water should pass to the mill, and below which the miller could not draw the water, I mean an under-water weir of a similar character to an overflow weir, which should prevent the miller from drawing the water out of the navigation pond below a certain level?—Yes, that might be done.

2053. Would not two weirs of that description prevent a miller from abusing his powers over the water?—Yes, I believe they would. I think, in reference to floods, that self-acting sluices ought to be inserted at the overflow weirs. I do not approve of self-acting sluices generally, but I think that when a flood rises suddenly in the night self-acting sluices might carry the water off without allowing the flood to get upon the land.

2054. If there were two weirs of that description placed at every lock and mill, one of sufficient length and proper height to let the barges pass out without flooding the land, and the other to prevent the miller from drawing the water out of the reach below a certain point, would not the only water that was requisite for the navigation be that which was necessary to fill the pound?—Yes, you mean for the passage of boats.

2055. Yes, and then the miller would have the use of all the remainder of the water?—Yes, down to the level of the under-water weir.

2056. When he knew that he had the control of the water in that way, would it not be to his advantage to keep the water at as high a level as he could, so as to get an extra head at his mill?—Certainly.

2057. Therefore an arrangement of that kind would apparently meet the requirements of the landowners, of the navigation, and of the mill-owners?—Yes.

2058. In any scheme that might be proposed for the improvement of the river, would it be desirable to merely alter the present system, or should an entire revision of the navigation be undertaken?—An entire revision of the navigation should be undertaken.

2059. And the river at each point should be put in the best possible condition?—Yes.

2060. I think I observed in your former evidence that you recommended that the sum of 30,000*l.* should be spent in restoring the navigation?—Yes.

2061. Are you still of that opinion?—I gave that evidence simply with reference to the navigation and the existing Acts of Parliament, understanding that the question was only one of restoring the present works; but I am decidedly of opinion that if a more comprehensive scheme is to be considered, then the estimate requires to be readjusted.

2062. The expenditure of 30,000*l.* then would be money thrown away?—Yes, if a comprehensive scheme is to be considered.

2063. I presume you would agree that the sills of the locks should be placed at a level to suit the quantity of water passing down in the summer?—Yes, certainly, if the river is canalized.

2064. If possible they should be placed at such a level, and the river should be dredged between the locks, so that in summer the river should assume nearly the character of a canal?—Yes, in any comprehensive scheme that certainly should be done; but for a mere patching up of the works I do not consider that necessary, except perhaps in some one or two instances.

2065. If a comprehensive system were carried out, and the summer navigation of the river canalized, as it were, and fixed weirs placed at the pound locks, why should it be necessary still to maintain those weirs above Oxford? Would not the regular flow of the river in that case be a sufficient water supply to meet all the requirements of the navigation?—I believe not, in summer time; but I should like by experience to ascertain exactly the quantity of water that would flow in a dry summer.

2066. Would it be any more or less than flows now?—Now it is penned and kept up at a greater depth, we get the water in flashes.

2067. You have the water intermittently, and in the other case you would have it down with regularity?—Yes, and I agree that if the normal flow of the water above Oxford was accurately ascertained and the river below Oxford was dredged, so as to receive that quantity in the manner that would be necessary for the navigation, then there would be perhaps no necessity for weirs above Oxford; but those works would be such a huge business, I can hardly think that the Thames would ever be worth the cost.

2068. Do you think it is possible for any engineer to form any estimate upon this subject without having a

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thoroughly good map of the Thames and proper longitudinal sections and cross sections at certain places?—For a new and comprehensive system certainly not; no engineer could possibly form an idea without such things, nor could he do so without ascertaining the precise quantity of water that flows through the valley.

2069. In readjusting the river it has been suggested that the mills will have to be bought up?—Yes.

2070. If a thoroughly good system of navigation were carried out, would not the millers have more control over the water for mill purposes than they have now?—Certainly.

2071. If the Commissioners were to take off the millers' shoulders the responsibility of repairing the weirs, would not the millers be benefited?—Certainly.

2072. Generally, would not the benefits that the millers would derive by the river being put into order be greater than any new disadvantages that would be imposed on them?—That is a question which can only be answered by reference to each particular case.

The witness withdrew.

C. Neate, Esq., M.P.

Charles Neate, Esq., M.P., further examined.

2073. (*Chairman.*) I think that you wish to make some additional statement with respect to the Thames?—Yes, a statement which I wish to substitute as a more precise exposition than that I have previously given of my view of what should be the management of the Thames. My object, in the first place, is generally to show from the various uses and appliances of the Thames, and also from the inconveniences which may arise from the neglect of the Thames, the kind of management to which the river ought to be subjected. I suppose that the original and natural use of the Thames was to carry off the water from the valley, so as to prevent that valley from being converted into a lake. This use entails by itself some general management, to prevent the passage being blocked up in different parts. Next from the supply of water there obviously arose the opportunity of turning it to account, as so much power, and mills were built. Those mills again require some management, to see that the level of high water is not exceeded. No doubt the right principle is that that level should never be higher than the bank of the river, and I presume that even if the mills had for many years kept their water at a higher level than is consistent with the drainage of the valley, it would be a very great question whether any such right to abuse the property of the river could be made good by prescription. It is very true that you may by prescription acquire a right to receive a benefit from other people's land, but I do not believe that you can, by any amount of prescription, acquire a right to do any damage. Obviously the next use of the Thames is as a fishery. In Roman Catholic times, when fish was an article of dietary on two days of the week, the right of fishing was very much more important than it is now—therefore we find in old statutes that is treated as of very great importance. There is an article in Magna Charta with regard to weirs and rivers. The next use of the river is the navigation. In that sense the river may be considered as a highway for the people in its neighbourhood to bring goods from distant parts and to carry off their own supplies. The last use, which in its development and extent is the most modern use of the Thames, is to supply water to different places upon its banks or near its banks.

2074. There is another use which I daresay you would include in your summary of the purposes of the Thames. One purpose from time immemorial no doubt has been to receive the sewage of the population living upon its banks, town population or otherwise?—Yes.

2075. You would, I presume, include that?—Yes. Now these various purposes, it is obvious, and I think still more so from your suggestion, may conflict with each other. For instance, the mills may interfere with the land drainage on the one hand and with the navigation on the other. In fact, if I understand Mr. Castle's evidence rightly, Wolvercot mill has diverted for the purpose of the mill the water which used to go to the navigation. Then, inasmuch as these uses of the Thames conflict, they require some general superintending board; that board, I think, should have some jurisdiction to restrain the different persons from encroaching upon each other. Under the present Navigation Acts the Commissioners have some jurisdiction—they have the power of inflicting a fine and of adjusting high-water mark. I think that a board with some such general superintending power is required. Then the question comes how is the money to be found for keeping up this staff and for keeping the river in a proper state. The revenue of the tolls, whatever it might have been if the river had been properly managed, has in fact proved insufficient; it has proved insufficient, I think, in consequence of the unfitness of the Board of Commissioners, who have been without a pecuniary interest to make the best of what may be called the profitable part of the Thames. I conclude, both from the experience of the Thames and from the experience of turnpike tolls, that an unpaid and disinterested body of Commissioners will not turn to the best account any revenue which may be entrusted to them for public purposes. In order to develope the pecuniary resources of the Thames you must introduce into the management of the Thames what I would call the commercial element; but it is very inconvenient and against principle that the commercial element should exercise anything in the nature of a jurisdiction for its own interests, and it would be requisite to place that commercial element under subordination to the general board of management. Everything on the Thames must be subject to the control of one body and contributing to one interest—that is to say, it is necessary that the governing body of the Thames should have the control both of the mills and of the drainage, whether it should directly manage them or not; that, in the first instance, the Commissioners of the Thames, whatever that body may be, should be placed in the position of owners of the Thames in every respect, that as against them no mill-owners should have any power of setting up a right of keeping up the water at any particular level, or of setting up, except for a time, any right against the adjoining mill. Of course the adjoining mill would be under the same hands, and even if inconvenience should arise during a short time, during any lease now existing, it would be set right at the expiration of that lease. One of the chief functions also of the board would be to see that any law prohibiting sewage to be cast into the river was properly carried out. The question then is, how to get the funds for this management. Looking, to the state of indebtedness in which the Thames is, and looking to the incumbrance of the mills and of the old lock owners, it is quite impossible to put the Thames in a proper and efficient state in which it can be made profitable without a very large outlay of money, and I do not believe that it would be possible to borrow the money upon the contingent chances of the profit to be made from the Thames. I do not think that it is possible to raise the money, unless the towns and counties which are interested in the maintenance of the Thames are made subject to some extent to the repayment of the money which may be raised. I would not subject the towns and counties to the repayment of the capital, but I think that they might justly be made subject to the interest, and I have no doubt that if the Commissioners put the Thames into a proper state throughout, if they had the channel properly dredged and the locks repaired, they would be able to raise, chiefly from the navigation, partly also from the fisheries, a revenue which would enable them to put by every year something considerable to pay off the principal of the money they had borrowed. I have no doubt that, taking

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30 years, which is the period commonly allowed in loans of that sort, they might pay off the whole of the debt, and then the towns and the counties might be discharged from their contribution. I have omitted to state the revenue which might be derived from the water companies of London. That, no doubt, is a very great question, and probably any proposal to tax the water companies of London to a greater extent than they are now taxed to the Thames Conservancy would be met with very great opposition; but I think that the right of taxing them will be put in a new and a much stronger position if the towns on the Thames are required to divert their sewage from the river. So long as we use the Thames as a natural sewer we have no right to tax the citizens of London for their right of using the Lower Thames as a supply of water; but if we keep our sewage from the stream we shall all of us at every town upon the river be at a very considerable expense for the purpose of supplying pure water to the citizens of London. I think that in all those ways, without any great hardship or pressure, a sufficient revenue might be raised to pay the interest for the money required, and also to pay off the capital by instalments. Even with this prospect it might be difficult to get individuals to advance the requisite supply of money; but I think that, considering the importance and the public nature of the interests involved in the right management of the Thames, the Exchequer Loan Commissioners might properly be authorized to advance the requisite sum upon less security than people in the ordinary money market are willing to lend money upon.

2076. How is the body which is to work an Act of Parliament such as you propose for the management of the Thames to be appointed?—That is going a little more into detail than I am prepared to go. I am not in a position to give anything but a very general opinion that it should be an elective body appointed by the counties and towns connected with the Thames, in certain proportions to be fixed by the Board of Trade or otherwise.

2077. How would you propose to deal with existing rights?—It seems to me precisely the same thing as takes place in the case of a railroad. The Act constituting a new Thames Commission would give the Commissioners power to buy up the rights of the old lock owners, and of fishery and of mills, upon certain terms prescribed in the Act, and to buy up the bonds. Of course there is always a difficulty in making an estimate. People may under-estimate the expense of repairing the Thames, but I believe that it is not so complicated a matter but that an engineer, assisted and controlled by other engineers, could give, within a very few thousand pounds, the whole estimate of the expense which would be required to put the river in a good state of repair, and the sum which would be required to buy up the old locks and fishing rights, and so on, could be very speedily calculated. A suggestion has been made to me that you might refer to the income tax returns to ascertain the value of the mills. The interests to be bought out are very limited in number and extent, and I do not apprehend any great difficulty; one or two mill owners might stand out and give trouble, but I think that in most instances it would be a matter of amicable arrangement, and that so much would be given to the mill owner to consent to have his mill put upon a new footing. Of course the question of buying up the bondholders would have to be discussed before a committee of the House of Commons. It would be like the winding up of a bankrupt estate, and if after hearing both sides a committee of the House of Commons should say that 10 or 15 per cent. upon the bonds should be the price, that would settle that question.

2078. Would you give to the commission the powers of the Lands Clauses Consolidation Act in order to settle the compensation for vested interests?—Yes.

2079. Is not that without exception as expensive a machinery as ever human ingenuity devised for the purpose?—I have no doubt that if you proceed under the Lands Clauses Act litigation will arise with the mill owners in some instances; but I put this whole plan forward as the only alternative from leaving the Thames to take its chance. There is one point which I omitted with regard to the water supply; it is a point upon which I cannot give information, but which I venture to suggest to the Commission for their investigation. It is this—to what extent do the water companies in London benefit in the way of regularity of water supply by the navigation of the river being kept in a good state. I was talking to the chairman of one of the great water companies, who said that he did not care if there were no locks at all above Teddington Lock, that all he wanted was Teddington Lock. I believe that to be an erroneous opinion.

2080. The water companies do not pay anything for taking their water?—The company which I allude to pay 200*l.* a year to the Thames Conservancy.

2081. Is not that interest for money expended by the Conservancy in the erection of works?—That is the explanation which is given by the Conservancy.

2082. (*Mr. Harrison.*) Do you propose that the whole of the river up to Lechlade should be included under this new arrangement and put in a navigable state?—Yes, and it might be a question whether you should give to the new commission the power to appoint a drainage committee with the powers of commissioners under the Land Drainage Acts.

2083. It is a new element altogether in the management of the Thames, is it not, to make the counties responsible for the payment of the interest upon the money which is expended in putting the river into a good condition?—The counties in Ireland have been made to contribute to put the Shannon into a good state.

2084. I suppose that from the earliest times the Thames was a navigable river in some way or another for small boats?—Yes.

2085. The first improvement upon it would be the introduction of these weirs, erected in all probability by the riparian proprietors?—I take it that the original object of the weirs was mills.

2086. A vast number of weirs exist in the upper part of the Thames where there are no mills?—If not for mills, it was for fisheries.

2087. (*Chairman.*) You think that that was the first purpose to which the river was turned from a state of nature?—Yes, there were no doubt boats always, but the first occasion of any expenditure upon the Thames was either for mills or fisheries.

2088. (*Mr. Harrison.*) And not navigation?—And not navigation. I take it that from very early times the owners of those mills and weirs were bound to keep a clear passage; the weirs were made subject to the right of passage, though they were not made for the navigation.

2089. Although they were put up for fisheries or for mills, they were useful for the navigation, and the owners of the weirs levied a tax upon boats passing up and down the river?—Yes.

2090. In that condition the river was still in the hands of the owners of the adjoining land?—Yes.

2091. And if any injury was done to their land by the erection of these weirs it would be their own fault?—Yes.

2092. You have not said anything about the current repairs of the navigation after it shall have been restored. If the traffic should not be sufficient to keep the river in proper order, how would that very important matter be secured. Would you put the expense of the annual repairs of the works upon the counties as well as the interest of the money expended in their restoration?—No, I would simply put upon them the interest of the money, because I am satisfied that with the income to be made from the river all the locks upon it and the bed might be kept in a most efficient state, and a considerable surplus would remain to gradually pay off the debt. The burden upon the towns and the counties would become less every year.

2093. Still that is a supposition. Supposing that the traffic was not sufficient for that, how would you

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do, because it is not desirable to go on making the river more complicated by each move and not to make any provision for its permanent maintenance?—Everything must be a matter of estimate.

2094. Then seeing that you contemplate a considerable traffic upon the Thames, if it was put into a proper state, might it not be the best method of treating the bondholders to let them have a reversionary interest in the tolls, like the original shareholders of a railway who have been postponed to the preference shareholders?—That might be offered to the bondholders as an alternative, but only as an alternative. I think that you are entitled to treat a bondholder as a creditor of a bankrupt estate, and that he is not entitled to benefit by the increased value to be given to that estate by funds the produce of taxation.

2095. Ought the bondholders to suffer for the bankruptcy of the Commissioners?—It is the bondholders' own neglect; they have suffered because they chose to leave their money at high interest, trusting to the security of the Thames, rather than exact payment. They might have got payment in the prosperous state of the Thames. However, that is a difficult question. I am myself disposed to make very liberal terms with the bondholders, and most of them are willing to settle at 10 per cent. I would not myself propose to give them less than that. Nobody will spend money upon the Thames if there are bondholders to the amount of 20,000 keeping back their claims and then claiming to be paid in full.

2096. (*Chairman.*) You say in your letter to the Home Office, "I believe it to be a matter of urgent "necessity to provide reservoirs, the waters through-"out the country to be used for all purposes but drink-"ing, and that the spring water should be habitually "confined to that use." Have you formed any idea as to the capability of the valley of the Thames and its tributaries for such works as you anticipate?—I do not think the present water supply will always be sufficient for both drinking water and water for washing the streets, and for flushing the sewers, and all purposes of that sort. Eventually you must come to separate the two, and have reservoirs of water to be used for other purposes than drinking. But I am not prepared with anything definite, it is merely an idea which was thrown out.

2097. The town clerk was very strong in his opinion that the county magistrates alone should be the body to elect the managing board?—I think so for the county, because there is no other body to represent the county. If there was a county council the same as a town council, I should say that that would be the proper body to elect the board; it is only because the magistrates have to a certain extent usurped the management of the rates of the county in substitution of what ought to be an elective board that I think they should be the body.

2098. Then would it be sufficient to take the mayor in corporate towns and the chairman of the local board in other towns, or would you take the individual members of the town council?—For each town I would have the representative or representatives elected by the town council.

2099. Then in the case of Oxford you would have heads of the colleges?—I think that the University should have a separate representative, or it might be represented perhaps by the local board.

2100. (*Mr. Harrison.*) Do you not think that there would be great objection on the part of the ratepayers of the county to pay towards such a fund?—Yes, but I should think that those who represented the ratepayers of the counties would be able to feel the justness of such a rate, on account of the interest which the whole county, and not that part only which is contiguous to the river, has in the river. People more than 20 miles off have an interest in the great towns. If those who managed the affairs of the county thought that the rates should be raised in a greater proportion on the property contiguous to the river I would leave it so, just in the same way as is done with the land tax. All that the State does is to say, that a certain district should pay so much.

2101. If a tax is to be levied upon the tenant farmers in the same way as other county rates, will you not find great objection on the part of the ratepayers?—Any burden which is permanent enough to be taken into account in the adjustment of the rent falls upon the landlord, whether it is paid by the tenant in the first instance or not.

2102. (*Professor Way.*) Did you mean that the magistrates should be the elective or the executive body?—The elective body.

2103. They would be too many for the executive body?—Yes.

The witness withdrew.

Adjourned to to-morrow at 10 o'clock.

Oxford, Wednesday, 8th November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

HENRY W. ACLAND, Esq., M.D., F.R.S., examined.

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H. W. Acland, Esq., M.D., F.R.S.

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2104. (*Chairman.*) You are Regius Professor of Medicine at Oxford?—Yes.

2105. How long have you resided in Oxford, or known Oxford?—I have known Oxford for 30 years. I have been holding a Readership of Anatomy or the Professorship of Medicine for just 20 years.

2106. Is the Thames liable to flooding?—Yes, in the whole of this district there are frequent floods.

2107. Those floods occur at almost all times of the year occasionally?—They occur at all times, I believe, and last sometimes for many weeks. I have seen a very heavy flood here, covering nearly the whole of Port Meadow, in the middle of the summer. That happened in the year 1860.

2108. Upon the retiring of the water has there been any offensive effluvium?—When the floods go off generally there is a most offensive effluvium in the whole district. In traversing the flats about Oxford you perceive it along the whole course of the river.

2109. Is it more perceptible at one time of the year than at another?—At any part of the year, upon retiring of the water, there has always been an offensive smell.

2110. Have you practised considerably amongst the poor?—I am physician to the hospital here, and have been so for 18 years, and therefore am in the constant habit of seeing what may be considered an average example of the poor of the whole district.

2111. I believe that you have studied the character of disease in Oxford, when cholera prevailed here?—There have been three cholera epidemics here; one in 1832, one in 1849, and one in 1854. I served professionally in the last two epidemics.

2112. I have before me a memorial, accompanied

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by a map, of the cholera at Oxford in the year 1854; that I believe was drawn up by yourself?—It was.

2113. I believe that there are types of disease consequent upon natural conditions, such as damp subsoil, these occasional floodings, and drinking impure water; have you noticed any prevalence of that class of disease in or near Oxford?—In a great many cases.

2114. Have you any type of disease analogous to ague?—No, it is a somewhat curious fact that a case of ague in this district is a very rare thing; we very rarely see ague at our hospital.

2115. Do you know whether it prevailed at any former period?—I have understood that it did.

2116. I think I remember Mr. Christison of Edinburgh stating as a fact that ague seemed to have left the country generally?—I believe that that is the case; at all events ague is very much more rare than formerly.

2117. I suppose that types of disease do change, of which you can give no account?—Yes, and therefore the absence of any particular disease may not necessarily imply a really improved standard of health upon the whole; it may be that a low kind of health shows itself in some other way.

2118. Do you recollect your average rate of mortality here per thousand?—Somewhat over 22 per thousand, that is to say, some four or five deaths at least per thousand above what should be the average of a thoroughly well-conditioned town.

2119. Your intimate knowledge of Oxford in its better parts and in its worst parts would enable you to say whether or not disease may be imputed to defective house construction as well as to defective arrangements in sewerage and in other sanitary appliances?—I suppose that Oxford is situated in those respects the same as every other place where there is great variety in the population and in the character of the dwellings. The character of the dwellings in some of the low parts of Oxford is bad enough to produce disease, but it is not very bad; it is worse in Edinburgh, and many other large towns. Then the soil in some of the bad parts of Oxford is also of that kind that we know from widely extended observation to be productive of ill health; it is damp, and what with old cesspools and new cesspools overflowing in the clay or infiltrating in the gravel, it constitutes an unhealthy site for a dwelling. This is the case in a number of districts in Oxford which are marked in my map as centres of disease during a long period.

2120. Shall I find in this report any tabulated list of the rate of mortality in those special districts, as compared with other portions of the city at the time of the prevalence of cholera?—Yes; Oxford is very fortunately circumstanced with respect to sanitary investigations which have been made concerning it. There has been laid before the university and city at various periods, the most ample, and I may say elaborate, information upon the subject for the last 20 years. Mr. Ormerod, whose report I have here, a gentleman of great talent and whose death was a public loss, wrote the first report, and then Dr. Greenhill, now of Hastings, and Mr. Allen, took the trouble of conducting for a considerable time, with the assistance of a scientific society here, a set of tables, analogous to the Registrar General's tables, on the mortality of the district; these tables were made with very great care, but the work was not encouraged, and being a very laborious thing it was dropped. These tables are quite a model for any town, in fact they were started in order to be a model; they lasted for about two years, and after that came my own cholera report, which contains a great deal of information on the cholera epidemic of 1854, and on other sanitary subjects. Therefore, the facts of the case are accessible as public documents to everybody and have been so for many years.

2121. Do you know any houses, or any group of houses, in Oxford, cottages or tenements, of such a kind as that, supposing them occupied now with fresh tenants in a good state of health, you could have no hesitation in predicting that very shortly you would have certain types of disease in excess, and poverty to relieve as well as sickness to attend to?—Oxford is not a large place and I should be unwilling to allow any exaggeration on this matter to pass from me. There are individual houses, no doubt, and alleys to which your remarks would apply, but these are comparatively few, and the population so circumstanced is not very large. It is, of course, our business to make the tens healthy and happy and moral, just as it may be the business of Liverpool and Manchester to make their thousands so. What I should say is, the most prevalent result of bad accommodation here is consumption and a low scrofulous condition of children and persons in middle life, and generally what a physician would call a low character of health.

2122. I have been gravely told by professors of medicine and by men lecturing to medical men that they have no faith whatever in the sanitary engineer; what is your own experience as to the effect of a foul condition of things upon the health of the persons exposed?—No medical man can have paid attention to the sanitary condition of the dwellings of the poor without knowing that upon various sanitary circumstances their length of life and their power of bringing up their children depend. There is nothing more certain in medical knowledge than that is. But difficulties have been imported into the question from persons deriving hasty conclusions from particular data. My belief is that usually it is a combination of circumstances which produces ill health, and therefore that whoever asserts that it arises from any one thing exclusively, as emanation from sewers or small cubical contents of apartments, &c., &c., is very likely not to be borne out by the result of further investigation. In the cholera epidemic of 1854 we had that remarkably proved. I was at that time consulting physician to the board of guardians, and therefore saw all the daily returns and knew everything which went on in every part of the town. I noticed that diarrhœa was generally severest in the alleys. That was what might have been expected, but it also partly depended upon the want of food and upon large numbers of people being out of work in the long vacation. By private subscription a soup kitchen was set up within 20 yards of where we are sitting; the people had very good meat soup, and to the best of my judgment the effect of the addition of the better food to the diet of those people in those districts was clearly proved by the diminution of diarrhœa.

2123. Have you as a student read of the condition of England and of our gaols a century or two centuries ago?—Yes.

2124. What was the condition of the gaols in England previously to Howard's labours?—They were of the most frightful kind.

2125. What was the character of disease which prevailed?—Various kinds of fever, arising from altogether defective hygienic conditions.

2126. One, I believe, was specified as gaol fever?—Yes.

2127. Have you known any such type of fever in the model gaols now?—I believe not at all; certainly not here.

2128. That form of disease has been banished?—I believe so.

2129. And whatever may have been the cause, whether improved construction, or improved diet, or improved ventilation, something has occurred which prevents that type of disease now?—The whole condition of the people in the gaols is altered; more attention is given to them than sometimes to honest people in the workhouse.

2130. Do you think inferentially that honest people might enjoy the same immunity from disease as prisoners if they had all the similar advantages of food and fresh air and cleanliness?—Most certainly, but then they would have to pay for it.

2131. The poor would have to pay for it?—Certainly they would.

2132. Have you formed any idea as to who pays

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now for this disease and premature loss of life?—The ratepayers who will not have their places in a good sanitary state.

2133. The evil, then, is not necessarily confined to the poor, but it pervades all society?—Certainly; if we have a greater amount of pauperism and ill health society at large pays for it.

2134. Then the interest of every individual in the community is bound up with the welfare of the poorest?—I believe so entirely.

2135. Then, as a physician, you would not say that a Government could properly be taunted with practising socialism in its offensive form if it took means to see that every poor person had the chance of enjoying health—what means I will not pretend to say—but if it took care in some measure of every individual born into the State?—There are some things which men ought to do for themselves; they ought to be industrious and be good citizens personally; but there are other things which individuals, especially those who live from hand to mouth by their daily labour, cannot by possibility do for themselves, and which can only be done by the community in some form; and it is simply a want of political wisdom which hinders Government from taking a truly liberal view of their liabilities in that direction. It is all but impossible for the poor, who live by daily labour, to effect the combinations which alone can produce a sound sanitary condition of the people.

2136. Is any municipal control necessary to regulate persons in laying out streets and building?—Directly there was a talk of the Great Western works coming here the other day there was naturally great excitement in the district with regard to the opportunities for money profits which would arise, and, among others, in the building departments; and at once some houses were begun to be built in the northern part of the town, on clay and with cesspools. Now that was within a few months of our putting ourselves under the Local Government Act, and on the very verge of our introducing, as we hope, a complete system of drainage into the town. As it is, the whole of the northern part of our town, the district called Jericho, is undrained. An attempt was made many years ago to drain it, but that drain broke down and failed altogether; it cost a good deal of money, and then would not work. A large part of that district is still drained by cesspools, and not by regular drainage. This has an important bearing upon the primary object of this Commission, the condition of the river, because when the town is drained the amount of sewage matter to be disposed of will be very much greater than it is now. My map and Ormerod's map show the same patches as seats of disease—Jericho, St. Thomas's, and St. Clement's. We must be careful to what we attribute the prevalence of disease in a district, because generally a variety of circumstances concur. In the same districts we find the poorest population, many of the worst houses, and undrained parts. But whilst St. Thomas's and St. Clement's lie close to the river, the upper district, the northern district of Jericho, does not lie close to the river, but lies on a higher level. Naturally it would be the healthiest part of the town because it is the highest, and is now the freest from dwellings, and might, no doubt, be kept in a perfectly healthy condition. St. Thomas's and St. Clement's, on the other hand, are large, and have a good deal of poor population; but there also the conditions are different, because, although a part of St. Thomas's district is very old, a part is new. Within the last century a great many houses for the poor have been built on low levels, most unfortunately, and they will always be a source of difficulty until an efficient system of drainage has been carried out.

2137. Have you yourself any experience of evils from malconstruction of cesspools?—I have seen various instances of disease unmistakeably arising from cesspools built outside the house and lying against the wall, so as, in fact, to saturate the foundations and to allow the gas to run up through the old rubble walls into the bedrooms; I know instances where the cesspool has been constructed in the middle of the house.

2138. Have you had any experience of an improved state of health where the cesspools have been emptied and filled up, and a better system of drainage has been introduced?—I know instances in districts formerly unhealthy where by attention to the drainage the health of the inhabitants has been improved.

2139. Do the outlets to the existing drainage in the summer cause a nuisance in the streams or rivers?—The condition of one small back stream is very bad.

2140. Is that the Cherwell?—No, but we are making the Cherwell bad as fast as we can; we are draining into it from the new parts of the town; but the streams in the old parts of the town, having had a start, can furnish better instances of sewage deposit, especially the mouth of what is called the Trill mill stream.

2141. Has it fallen within your knowledge that private wells in Oxford furnish impure water?—Yes, certainly.

2142. There are cesspools in the subsoil, and there are wells in the same subsoil?—Yes.

2143. Many of those cesspools, I suppose, are what are called absorbing cesspools?—Yes, generally.

2144. That is to say that a vast quantity of fluid matter is supposed to disappear in them?—Yes.

2145. There are on the same properties wells out of which annually a large quantity of water is pumped for use in those dwellings?—Yes.

2146. And the inhabitants may or may not drink that water?—Yes.

2147. Do you think that the cesspool liquid by passing through the subsoil undergoes any such change as that when pumped up it becomes innoxious?—The medical evidence of how soon water, once made poisonous by organic matter, becomes healthy, is very unsatisfactory. I do not know how soon it becomes again safe. At the time of the cholera, in several cases I personally went to the alleys and, explaining my motive, begged the people there not to use the water in their alley. At Brackley, which is a small town, there have been within the last year over 100 cases of fever, and there is very little doubt that the cesspools there communicate with water which is there drunk. That circumstance alone, if it be the case, would account for the spread of typhoid fever. We had a most notable instance of cholera here by water supply in the case of one of our public buildings, about which, I think, there is no doubt. Impure water, in fact, is not only a cause of ill health, but of positive danger to life in cases of cholera and typhoid fever. When once this water has been made poisonous, I do not know how soon it becomes safe, and therefore sewage should be kept out of the river altogether. Again, in Horwood, on which I was called upon to report, there was a fatal fever, which arose, in my opinion, in a great measure from the sanitary condition of the houses. Some of the houses in which the fever prevailed were quite new. When I first noted that fact I was perplexed, but it is perfectly clear that old houses having so many holes in the roof, and broken boards with crevices in them, have, if the ground is dry underneath, very good through ventilation which answers the purpose of a much larger cubical space, and so forth; upon all which I need not dilate. In making sanitary inquiries, it is necessary to take the whole circumstances into account, and not to suppose that a spick-and-span new cottage is a better place than a tumble-down old one, unless it is constructed in a proper sanitary manner.

2148. That is to say that modern housebuilders in the perfection of their workmanship neglect the question of ventilation?—They do a great deal of mischief by making the houses airtight.

2149. By the malformation of the windows; windows not made to open at the top sash?—That most atrocious evil is becoming less fashionable than formerly; but I have seen patients ill in splendid lofty rooms, who either did not recover, or whose recovery was postponed and whose life was endangered

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by the simple cause that the top sash of the windows would not open.

2150. Do you consider that the river water at or below Oxford is fit for domestic purposes, such as tea making?—The river water above Oxford is fair enough. Below Oxford, for some distance, I believe it to be quite unfit for drinking, and I am sure it is most unpalateable, because I have tried it. The whole condition of the river about Oxford is becoming very critical. Banbury is above us on the Cherwell, and is taking great pains to pour all its sewage into the Cherwell at this moment. We in our turn are paying it off on those below us by doing all that we can to turn our sewage into the river.

2151. Then if the river water is to continue to be used upon a great scale for domestic supply to the citizens of London, it is very important that the standard of purity should not be allowed to deteriorate?—The thing is self-evident; we know, as I have said, that we can make water poisonous, but we do not know how soon it ceases to be so; at all events I do not know. Therefore there is only one thing which I submit as regards the metropolis (and I have been saying this as loudly as I can for many years), namely, keep all this dangerous refuse matter out of the Thames altogether; whether this is practicable or not is another question, but there is only one safe principle, namely, to keep it out. Here, in Oxford, we are in urgent need of a complete system of sewerage for ourselves, but looking at the thing as an Englishman, in a national point of view, I certainly desire that it may not be done to the injury of our neighbours below if we can help it, and the same thing applies with regard to floods.

2152. Do you know of anything that has been done or omitted to be done which would influence the flooding of the valley of the Thames?—I know that the different obstructions on the river are the cause of floods in all directions, and that the floods are most prejudicial to health, and under proper management unnecessary and therefore a grievance.

2153. As a medical man, if the head of water of the mills below could be permanently lowered so as to prevent saturation of the subsoil above and to prevent the periodical flooding, do you think that the sanitary condition of the city could be improved?—I have no doubt about it. So strongly do I feel, in common with many others here, that the abating of these floods is one of the great sanitary works which ought to be executed in the whole of the Thames valley district, that we signed an agreement some time ago to endeavour by any means which we could to get rid of the embankment at Sandford, through which all the upper Thames water necessarily passes. We had a long negotiation with the proprietor, Mr. Norris, and it simply ended in a refusal on his part. We were allowed to do nothing, our belief being that to him the abating of that which was an injury to our health would have been little or no injury. As to the effect of the floods on the health of the district, many a time I have come out of the perfectly pure air on one of the neighbouring hills, with the sun just rising on a beautiful morning, and have suddenly driven into this mist, and have come into the damp and reeking town.

2154. I may take it for granted that you do not want selfishly to benefit Oxford at the expense of her neighbours, but that you think that the entire valley of the Thames is worthy of consideration?—I have always declined to take part in any scheme which I looked upon as purely local, because I am not only an Oxford man but an Englishman, and have no idea of taking up a question of this kind, which ought to be treated as a whole, merely for local purposes. All our local purposes will be gained by joining in the amelioration of the whole, and therefore I feel it my duty to do what I can to promote the interests of the whole.

2155. As regards those mists or fogs, are they the result of an absolute flooding of the surface, or of the waterlogged condition of the lands?—We have those fogs both with and without a flood. My opinion is that the cause of the mischief with us is the sodden condition of the ground evaporating a quantity of moisture from decaying vegetable substances in the spring and the autumn. I think that is most deleterious to health. Therefore I wish for the drainage of the Thames valley, not entirely for the sake of preventing floods, but in order to get rid of what I consider the sodden condition of the soil.

2156. Have you noticed other parts of the valley of the Thames where similar fogs exist?—Not in the same way as I speak of Oxford, but I am familiar enough with the phenomenon. Fogs are a very common condition in river valleys.

2157. The appearance of the fog is almost like a sheet of water?—Yes.

2158. And you see the trees half way out?—Yes.

2159. And the houses occasionally half way out?—It varies, sometimes the fog seems to fill up the basin formed by the hills, so that you can hardly see the spires through, as it were, the smoke.

2160. Do you know that when you vapourize water you take off latent heat. You take away in the vapour heat which otherwise would be present in the atmosphere?—Yes.

2161. You tend to reduce the local temperature?—Yes.

2162. If you subsoil—drain and remove excess of moisture in the soil, you may raise the temperature from four to six degrees over that land, which would be equivalent to carrying it southwards so many degrees upon the surface?—Yes.

2163. If it should be practicable so to increase the temperature in the valley of the Thames, and especially at Oxford, as to give you a difference of 4 to 6 degrees in these cold periods, would it be in your opinion an advantage?—I have no doubt of it. With my patients who are residents in the valley of Oxford I have found that change of air is remarkably beneficial, more so even than is usual in other cases, especially in the case of minor ailments. And minor ailments which not immediately increase the death-rate are just as worthy of attention in a large sanitary point of view as the fatal ailments. It is just as much the duty of a physician to make people comfortable while they live, and to save them illnesses, as to cure them of disease they need not have had. I myself believe that the efficient drainage of this district would altogether promote the elasticity of the air and the health and happiness of the residents.

2164. You think that a question so large as that of the improvement of the Thames would justify the central government stepping in to relieve the district of the dead-lock which it has come to?—As long as 10 years ago, I spoke and published and did all I could to draw attention to the subject, thinking that until the Government took it up as a whole there was no chance of its being done, and I think so still.

2165. Some time ago a very influential deputation waited upon the Secretary for Home Affairs for the purpose of urging upon the Government of the day the necessity of action with respect to the Thames valley?—Yes.

2166. That deputation was composed of different interests?—All kinds of interests I think; at all events persons selected from all parts of the valley.

2167. Large riparian proprietors and representatives of colleges, and other persons interested in the property in the valley of the Thames?—Certainly. That memorial is published in the blue book of the Sewage Committee of 1864. But looking at the general constitution of the question, where there are so many conflicting interests to be considered and to be respected, namely the bond owners, the millers, the riparian proprietors, the navigation, and the sanitary question, including the water supply of the metropolis, I cannot myself understand how, without some central body exercising control, the several parties, are to be brought to an understanding. The millowners and the navigation are very often in a kind of collision, and we unlucky sanitarians are necessarily in collision with

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both, because we have first of all to consider the bearing of the river upon the health of the people.

2168. Is it within your knowledge that not only the Thames valley, but that the river systems of England generally, have fallen into abuse by the growth of populations and manufactures?—I considered it of great national importance that charge should be taken of this king of English rivers; but I am aware from personal knowledge and otherwise that there are rivers far worse elsewhere. I sincerely hope that the inquiry into the condition of the Thames and the legislation which may be founded upon the labours of this Commission may eventuate in the doing what is more urgently required in other places. I have lately visited the neighbourhood of Sheffield and Rotherham, and the river Tame at Birmingham, and of course I feel that the rivers at those places are much more shocking and much more difficult to deal with than this; but still that is no reason for not remedying this.

2169. Would you moot sectional improvement before the whole question has been decided?—I, personally, certainly should not, because if we take up any part, we are very likely, in doing that part, to do some mischief towards the solution of the whole. But if a complete scheme were marked out, then any minor part of it might be constructed, until funds and opportunity allow the whole to be done.

2170. Supposing Oxford to be sewered as perfectly as human ingenuity could devise, and the towns upon the banks of the stream above you not meddled with, you might have the river fouled after you have expended all your money to purify it upon the site of the city?—Certainly, look at Banbury, Witney, above us. At Banbury they are in a great difficulty, and it is an illustration of the kind of difficulty which we, or any other town, may be in. At Banbury they proceed to drain their town, and cast their sewage into the river, and immediately afterwards a miller declines to have all this sewage cast into the stream immediately above him, and gets an injunction, and then they have an eminent chemist and an engineer down, and the chemist proposes to purify this matter by means of chemicals, and that is found unsatisfactory, therefore they are in a state of litigation and difficulty. The definite object which every town has is, first, the getting the sewage away from itself; secondly, when it has got it away from itself, the doing no injury to those near and to those below, and, thirdly, the having an ample water supply. I have received a letter this day from a very intelligent person at Banbury, Mr. Beesley, who says, "It is right to mention that "our chief difficulty arises from the very scanty "supply of water on the Cherwell here, arising "mainly from a large portion of that from the springs "and streams above here being intercepted by the "Oxford canal, whilst the small proportion allowed in "dry seasons to reach us is dammed up for days by "the numerous mills on the stream." Now, there is a condition for a town to be in! Some gentlemen above cut off the water supply, so that the people at Banbury cannot flash their sewers, for what purpose? For the purpose of a canal. Then the mill owner below says, "You have spoilt the water for me, and I cannot "allow you to do so." So that between their not being able to get rid of the sewage, and not having enough water above it, Banbury is in a great difficulty. Perhaps I may here be allowed to put in a paper which I have in my hand, by Professor Rolleston, professor of physiology, who unfortunately is, from temporary indisposition, prevented from attending before you.

The witness delivered in the following paper:

Remarks by Professor Rolleston.

i. *Presence in Isis of solid parts of sewage.*

My attention has been of late years repeatedly drawn to the very repulsive fact of the presence in our river of a great amount of human ordure, both freely floating and floating entangled. I may have been led, in the first instance, to observe this by my natural history pursuits; but no such minute inspection of the water as the looking for freshwater invertebrata implies, is needed to convince one of the truth of what I say. I have often been annoyed when rowing for mere pleasure by the sight of the objects in question, and by the fear of their attracting the notice of others. So far as the "boating interest" is something besides "the racing boat interest" it is seriously affected by this state of things.

ii. *Relation of Fish to solid parts of sewage.*

It has long been a notoriety that fish haunt sewers. Juvenal speaks of a pike as—

> Pinguis torrente cloaca
> Et solitus mediæ cryptam penetrare suburræ.

Now I apprehend that what the fish does get from the sewer, is, firstly, such waste food as, never having been swallowed, has yet been somehow carried away together with fouler waste; and, secondly, such debris as have escaped digestion and are to be found in a greater or less proportion in all human ordure. It is to this foul feeding that I should ascribe the purgative property which is well known to be possessed at times by the flesh of our freshwater fish. The cycle of change from sewage to food must have more factors, stages, or segments than these two of ordure and freshwater fish, And, as we have no reason to suppose that a fish's digestion and assimilative powers can arrest chemical decomposition when thoroughly and extensively set up in albuminates, it is obvious that such depuratory influence as they do exercise upon solid sewage is limited to the yet undecomposed elements of fresh sewage. I apprehend that observation of the favourite haunts of sewer-feeding fish in Oxford will justify the use of the epithet torrens. The sewers have a sharp draught and rapid flow, and carry freshwater sewage matter.

iii. *Pisciculture in a highly cultivated country.*

It may well be doubted whether any great addition to the available food of the people can ever be expected in a closely cultivated country from an increase in the non-tidal parts of its rivers of any fish except the salmon. Fish are greatly dependent on insect life for their food, and insect life again, if in sufficient abundance to nourish a great head of fish, stands absolutely in need of a profusion of vegetable life. Forests, swamps, and jungles, left to run to waste are the surrounding of man in the ichthyophagous stage; it is needless to say how different this is from the closely shaven fields of our English river valleys; this view, I may say, is strongly advocated by Von Baer, in a small pamphlet published at Berlin in 1862, one of the oldest and soundest naturalists now living. I will not dwell on it further than to say that the natural history of the May fly, and the species allied to it, will furnish as good an instance as any of the relations prevailing between the two kingdoms.

If fisheries continue to be a fashionable method of obtaining sport, they will do so, not by virtue of the alimentary value of the results of such sport, and if fisheries in fresh water increase in number, fishermen will have to learn to be content with a smaller average size in their captures.

The habits of eels, though just reversing those of the salmon, may, perhaps, put them into the same category of exceptions to the rule at which we have hinted.

Suggestion as to a mechanical breaking up of solid part of sewage.

If a sharp current could be secured for a particular part of a main drain, and if this particular part had its inner surface made rough, say, as the top of a wall is made rough with glass fragments, I imagine the cohesion of the solid elements of sewage would be considerably reduced, and their powers of clogging any filtering apparatus considerably reduced also.

v. *Suggestion as to utilization of vegetable life in fresh-water.*

The American weed forms a dense felt in many of our streams, and anybody with or without any preconceptions as to the working of vegetable life can see that the water which leaves is clearer and cleaner than that which enters such a bed of weeds. This particular weed makes a considerable mechanical obstacle to the flow even of a sharply running stream, and has, therefore, a better chance than other freshwater plants for both adding oxygen to and subducting other matters from the fluid passing through it. If, however, any other weed (I hear of a special "sewage weed" being found at Stroud) should be found to build up into its system out of drainage or sewage water more of what might be useful as manure or disagreeable in a river, of course such a weed might be preferable to the American for this purpose. I should suggest that broad shallow ditches be made to receive sewage water after filtration, and that in these ditches the American weed be allowed to

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grow as it does in many ditches here. I anticipate that no objection could be taken to the discharge of water thus filtered mechanically, firstly, and physiologically, secondly, into a river. Comparative analysis of the water would shew much; and analysis of the weed would shew whether it could be of use as a manure.

vi. *The contamination by cesspools of the shallower wells in this town.*

The communication of the shallower wells with the cesspools is perhaps a truer expression than the one underlined above. It is more indecently obvious perhaps in Jericho than elsewhere; by being indecently obvious I mean being obvious to the naked eye. A *deep* well dug under the direction of the present Bishop of Nassau in Jericho is pure I think; but I have only tasted, drawn, and smelt it, not tested it in any other way. In the part of Jericho between Clarendon Street and Cardigan Street, in a street which is called King Street, I believe, but which had no name posted up this long vacation, the following circumstance occurred when I was visiting it this autumn, as a member of a nuisance removal committee. The story is gross, but its grossness is instructive as showing how physical conditions can brutalize. "The water of our pump, sir," said an oldish woman, not with any apparent wish to be rude, "is just like the water you make." The well water is not only often discoloured, but by the fact of its lowering causing a corresponding lowering of the neighbouring privy, speaks plainly enough to a direct communication with it.

I cannot bear to think that the new houses which were being built when I was there last, in that water-sodden district between the canal and the line of Waterloo road may, perhaps, be fitted out with cesspools *en attendant* a system of drainage which would lay their site dry and serve at the same time as an outlet for their sewage.

George Rolleston, M.D. F.R.S.
Linacre Professor of Anatomy and Physiology, Oxford.
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2171. (*Mr. Harrison.*) Is it the case that the parts on your map uncoloured are the parts drained and the parts coloured are those near the river which feel the effect of the flooding?—No, not quite. The inhabited part of St. Clement's is not exposed to floods, but the lower parts of St. Aldate's and St. Ebbe's are. Then the northern part at Jericho, excepting one little portion, is never affected at all by the floods.

2172. What do you mean by being undrained; do you mean waterlogged?—By "undrained" I mean unsewered. Some of the land is also waterlogged. I am told that there is land sold for building here at this moment in which the water appears at a little over a spade's depth. I have also seen several houses in another part of the town in which whenever the river is high, certainly when there is a flood, there is always water underneath the ground floor in which the poor people live, so that you could see the water through the crevices of the shrunk floor. A somewhat humorous account was once given to me by a man dangerously ill in one of these houses. He had his beer-cellar under this room. I wondered how he got at his beer cask if he had the water down in his cellar. He said, "Mistress goes after it, with each foot in a pail." Such a state of things however is restricted to just the lower portion of St. Ebbe's, and I hope and believe that it is an evil which will be entirely remedied when the river is properly regulated.

2173. You have mentioned that you have observed that the obstructions in the river have been increased?—By deposits,—they may be seen. I have been informed and believe that in the back part of St. Thomas's there is a deposit of several feet deep of sewage. These fœcal deposits in the upper streams in the back of the town and in small sewers there ferment and give off gases, and masses of this matter are thrown up in a black floculent form. The deposits are mischievous in two ways. First, by raising the bed of the river, and, secondly, by sending fresh decomposing organic matter down the lower parts of the stream. This is no Oxford affair, but belongs to all the numerous towns between Oxford and London more or less.

2174. As Banbury is to Oxford, so are Oxford and all the towns upon the Thames to London?—Certainly.

2175. Would it be well to have some government control over the erection of cottages in the country as well as over buildings in large towns?—As a legal or constitutional question I cannot say, but as a sanitary question unquestionably. There are many difficulties in the way of good cottages being built, especially expense; but if any sanitary inspector or competent person could be at hand to suggest what are the best conditions for country cottages, whether they were enforced or not, I have no doubt that many persons would be exceedingly thankful to him. People do not wish to build bad cottages; if they do so, it is generally from the lack of information. I wish that these forms which were prepared some years ago were more largely used.

The witness delivered in the following paper:

Date ____________________ 186

Cottage, No. ____________________ Parish of ____________________

Situation ____________________

Owner ____________________

Tenant.	Employer.

			Ages.				
Married?	Children.	Boys					
		Girls					

Number and Dimensions of Rooms used as

Bedroom.	Living Room.	Washhouse.
ft. by . high.	ft. by . high.	
ft. by . high.	ft. by . high.	
ft. by . high.		

What rooms have fireplaces?

Windows?	How many square feet of glass?	Can they open fully?	Are they near the floor or ceiling?	Are there windows on opposite sides of Cottage?	
In Bedroom	1				
	2			Upstairs	
	3			Downstairs	
In downstairs rooms	1				
	2				

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Is there a porch and back door?

Are there, or when were there, any lodgers, and how many, male or female?

Condition of drainage and privy?

Nature of water supply?

Pigstye?

Surrounding ground drained, or capable of drainage?

State of repair?

Probable cost of repair?

Is the cottage worth repair, or would it be better to rebuild it?

Is it wanted in the neighbourhood, or had it better be placed elsewhere; and where?

One of the great difficulties in the management of the cottages in a sanitary point of view in these agricultural districts is the sewage. The disposal of the ordure from the cottages would be, under sanitary inspection in a complete and orderly system of things, just the same as the disposal of sewage in towns. There is no reason why people should be constantly poisoned or die of typhoid fever in villages any more than in towns, and many of these evils in cottages and villages are remediable under a proper system of management. But the question arises where they shall put the ordure, because if they suddenly put it into their stream they poison their stream.

2176. Would it not be a very excellent plan, for some such form as this, to be sent by the poor law authorities to the different unions to be filled up by the relieving officers?—There is not the slightest doubt, that the poor law board could, through the agency of a registration like that, have in a short time in their possession complete knowledge of all the cottages in the country, with very little trouble to anybody.

2177. What do you think would be the result of the statistics of the health of villages situated in a healthy, hilly district, and of villages situated in the bottom of the valley of the Thames?—That would depend upon the local conditions, upon whether the people were in water, or out of water—upon the soil, upon the liability to floods, and upon the condition of the cottages. In one case I myself witnessed, the houses which were high up, being dirty and surrounded with muck of all kinds, were more unhealthy than the houses at the bottom on gravel land; but the whole matter requires investigation.

2178. Considering the variety of soil in the Thames valley, oolites, Oxford clay, chalks, and the tertiary formation towards London, do you not think that such information would give very valuable results?—I have no doubt that it would. The same method of investigation is also applicable to towns.

2179. Could you suggest any questions to be put directly to medical officers of unions, with respect to the state of cottages, so far as it is the object of inquiry by this Commission?—It would be very easy.

2180. Will you be kind enough to do so?—I will. (See Appendix.)

2181. (*Chairman.*) Did you ever notice whether the aspect, the lie of the land, whether the land fell to the east, to the west, to the north, or to the south, had any effect?—I have not the slightest doubt about it.

2182. Birmingham escaped the cholera, whilst Wolverhampton was scourged by it. The two towns were alike in elevation, in subsoil, in character of population. Certainly Birmingham had no advantage in point of water supply. The only difference that I know was, Birmingham drains to the east and north; whereas, Wolverhampton naturally drains to the south and west, and, as a consequence, the moist vapour-laden atmosphere, when the wind is from the south and west, was disseminated over Wolverhampton and was taken clean away from Birmingham. Do you think that this fact would account for the disease of one place, and the immunity of the other?—That raises the very important question, of the site that should be chosen for sewage irrigation.

2183. (*Mr. Harrison.*) Would the wind carrying the effluvia of the sewage have an effect upon the health of the population?—I know an instance, where the wind blowing from a quarter where considerable refuse was collected did produce several fatal cases of fever in a district, all the cases broke out during the prevalence of a wind which blew direct from the sewage just outside the town, and carried a most offensive miasma, which I smelt at the bedroom windows of the street where the disease occurred.

2184. (*Chairman.*) The question in its full bearing would go to this, is it worthy of consideration by a locality having to establish certain works in connection with town populations,—on which side they should be established, for instance, gasworks, if there is a choice of sides—cemeteries, if there is a choice of sides—sewage irrigation and offensive businesses of any sort, if there is a choice of sides; would it not be better to take the north or the east, or at all events to take that side from which there is the least amount of wind blowing?—Yes.

2185. Or from which the dry winds come?—Yes.

2186. A dry wind would be less injurious, and a damp wind, where you have foul matter, would be more injurious?—Probably so. In the case of Oxford, we are almost compelled to go to the southward and eastward.

2187. Down below Sandford lock?—Yes, unless we use steam power; 10 years ago I suggested that we should use steam power; we have a considerable slope at a moderate distance from here, on to which the sewage might be poured, if pumped.

2188. It is a notorious meteorological fact, that throughout England the prevailing winds are winds from the west and south, and the intermediate points of the compass?—Yes.

2189. I hold in my hand the annual return for 1862, from the Radcliffe Observatory, and this clearly shows the number of days to be in favor of south-west winds?—Yes, and I quite admit that as far as possible the disposition of the sewage of the town should be considered in relation to the direction of the winds usually prevailing there.

2190. (*Mr. Way.*) I suppose that you would not think of putting sewage on to land which was subject to floods?—No, but in our case we hope that the liability to floods will be remedied before the sewerage works are completed. Attempts have been made to show that these two questions, sewerage and agricultural drainage, have nothing to do with one another, but they cannot be separated.

2191. (*Chairman.*) If you attempt to irrigate the meadows that I saw yesterday in their present condition, you would make that which is swamp now a miasmatical swamp; you would put vast masses of animal matter in a wet subsoil which cannot absorb it, and if it cannot absorb it cannot disinfect it?—As it is now, that must be the necessary result.

2192. (*Professor Way.*) You spoke in the earlier part

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of your evidence of the effluvium after floods. To what do you attribute that; to the decay of the roots and grasses, or to any matter left on the land by the water itself, or to both?—I suppose both; sometimes we have here a very considerable deposit upon the land, after the flood is gone down; you might take it up like so much felt; there are large sheets of it.

2193. Is it possible that it is matter derived from the drainage of the towns?—I never examined it microscopically, but it occurs everywhere where there is decaying matter, and some parts of our river have a much greater quantity of decaying vegetable matter than others. During the winter time some of the streams are entirely choked up by herbage. The Thame, which drains the valley of Aylesbury, is said to be nearly choked up; I was told so by an old resident at the place. He says that it was 10 or 12 yards wide when he was a boy, and he can jump over it now, and he is 60 years of age. The stuff comes from the herbage, which formerly used to be cut away or floated away during the summer, but is now left to decay in the winter. The same is the case with ditches and other places up the river. To clear out the beds of the streams in summer is a matter of police or sanitary regulation, which also requires looking into; the condition of the streams is principally due to its being nobody's business to clean them out. Some farmers do it, and some farmers do not.

2194. (*Chairman.*) Will it be a wise thing, do you think, to have a scavenging of the river as of the road?—If rivers are to be the means of water supply, to leave them neglected, to let them take their chance, and allow everybody to do just as he pleases, is in my opinion irrational.

2195. Are there not drowned animals, dogs and cats, left floating about upon the water near Oxford?—The last time that I pulled my family down I counted no fewer than the floating carcases of six dogs between here and Iffley.

2196. I need not say that if that occurs in the summer time they are likely to be very offensive?—Just so, and they were so offensive on this occasion that my party declined to go another time.

2197. It ought to be some person's duty to see to the removal of these offensive floating carcases?—Yes, for I do not know why, if I go down the river in a boat, I should be more plagued with the dead dogs of Oxford than if I drive down St. Aldate's.

2198. Would it have taken a man all day to have removed those dogs and buried them?—No.

2199. Would not the expenditure of half-a-crown have disposed of the job?—Yes.

2200. Would it have been worth that expenditure, so far as you were concerned?—I would have given half-a-crown for the purpose with pleasure. I am bound to say that I never saw so many carcases at this spot before, and I do not know how they happened to be there then.

The witness withdrew.

Mr. T. Routledge.

Mr. THOMAS ROUTLEDGE (of Eynsham paper mills, and Ford works, near Sunderland) examined.

201. (*Chairman.*) You own a paper mill?—Yes, on the river Evenlode.

2202. What distance from Oxford?—Six miles above Oxford.

2203. What kind of power do you use in the manufacture of paper?—Water and steam.

2204. You work by water wheels?—Yes, we are working two breast-shot water wheels. When I went to the mill first we were working four, but we have discontinued one on account of the scarcity of water.

2205. What is the head of water?—Five feet six inches.

2206. What is the water power?—It is variable; in summer it is scarcely anything at all—in winter it is considerable, and you may then assess the power that I use, or rather might use. I have had these mills for eight years. When I went there first the whole district above me was marshy and spongy; but owing to the influence that has been exercised all over the country by drainage I, like those at other water mills, am suffering by excessive flashes and again by considerable scarcity.

2207. In consequence of the water coming off more quickly?—Yes, by superficial and deep drainage. We cannot detain the water. We have got our notch on above, and we are bound to let it go.

2208. It comes off now more rapidly than formerly, and leaves you with longer periods of drought?—Yes, no doubt.

2209. A considerable breadth of area has been drained in the eight years that you have been there?—Yes, a little above my mills.

2210. Therefore you consider that you have had practical experience of the effect of that drainage in influencing your mill power?—Yes. I should also mention that the disforesting of Wychwood has had a considerable influence.

2211. Did that take place within the period of eight years?—Yes, I believe within eight or nine years.

2212. Where did the drainage take place above your mills?—There was a tract of marshy land that ran up from Eynsham almost to Blenheim. That has been drained, and generally drainage has been carried on greatly over the district during the last eight years. Before that, I have understood from friends of mine, farmers and proprietors of land, that drainage was, comparatively speaking, unattended to. Within the last eight years I have watched it, being largely interested in mill property in other districts, and in the water question.

2213. To what extent is irrigation carried on in Blenheim Park?—So as to have a very considerable effect upon the navigation, especially in short water time; in point of fact, just as the Duke begins to find out that his grass wants a little water we begin to find out that there is very little water in the river.

2214. Have you made any actual observations as to the relative volume of the summer flow when you first took the mill, and the summer flow at the present time?—No actual observations; all we can tell is the amount of work done—the quantity of paper made.

2215. In the course of eight years, would not the variations of the seasons make such differences that you could hardly give any reliable result?—Variations in the rainfall must, of course, be taken into consideration.

2216. For instance, after 1860, for two or three years we had very wet seasons, and those two periods would extend over five years out of the eight you have been at Eynsham?—Yes; but in wet seasons we fall off also.

2217. In the summer time?—Yes; and it is speaking from that fact and from what I have heard locally that I state, unhesitatingly, that the water supply has dropped off, simply because we cannot hold it. A rainfall, of course, sometimes occurs, but owing to deep drainage and surface drainage, the water comes down with a flash and we are bound to let it go. Formerly the land was spongy, and it was acted upon atmospherically.

2218. Can you state in general terms the power that you used at the first period of your working?—When I took this mill there were four water wheels actually going, now there are only two. One was a driving process; this I relinquished first, finding a scarcity. Another drives the paper machine; I relinquished that also. As to the other two, one is for 4 months out of the 12 doing nothing, and then the other one, when we do work it, just walks round. In addition to those four water wheels, there were two other waterways provided for by archways called "thoroughs," which have never been used.

2219. They were built by a mistake of the first proprietor?—By no means; at that time drainage was not an institution as it is now; the district above

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was spongy, both from trees and constant infiltration of water into the ground, and also from the mossy character of the district above and below Wychwood.

2220. (*Mr. Harrison.*) If the water comes down more rapidly, do not the extra arches come into play?—The arches were provided for extra wheels to be put in, upon the assumption of the engineer, no doubt instructed by the owner, that there was water power sufficient to work them, but wheels were never put in.

2221. (*Chairman.*) What is your nominal horse power in the driest period?—In the driest period 10-horse power.

2222. And in your best working state?—With the two wheels we might probably get 40-horse power; but we do not do that.

2223. I will take it from 20 to 40-horse power?—We do not get 10 or 20-horse power for five months in the year.

2224. What amount of steam power have you?—About 50-horse power—40 one engine and 10 another.

2225. Do you work by high pressure or condensed?—Condensed in one—high pressure in the small one.

2226. What weight of paper do you make in a week?—On an average, 6 tons a week; but the average has been dropping down in the last three years, owing to scarcity of water for power. We could remedy that by adding steam power, but, unfortunately, we have to use very dear coal.

2227. What do you pay for coal?—15*s.* a ton.

2228. What weight of coal do you use per week?—30 tons, on an average.

2229. How do you get your coal—by railway or by water?—It comes by canal to Eynsham Bridge. I get coal from Ashby-de-la-Zouche, in Leicestershire, or from coal mines in the neighbourhood of Coventry.

2230. (*Mr. Harrison.*) You are so far interested in the preservation of the navigation in that part of the Thames from the canal to Eynsham?—So far, I am.

2231. Is there any difficulty of getting coals by that method?—In summer time we are a little slack of water sometimes, and in winter sometimes, from frost.

2232. Have you railway communication with the mill?—Within a mile on one side and three miles on the other—there is the Witney and Oxford Railway on one side and the West Midland Railway on the other.

2233. Do you ever obtain coals by railway?—Yes, we have done so when we could not get them by canal.

2234. You get your coals by canal because you get them cheaper?—We get a better description of coal, but we are promised an extension of railway into the Welsh districts, and then I shall use Welsh coal. At the present time Staffordshire coal is not so good as coal from the midland districts.

2235. (*Professor Way.*) What kind of paper do you make?—Common printing paper—cartridge paper.

2236. Do you make nothing but white paper?—No.

2237. What materials do you employ?—Exclusively Spanish grass—no rags.

2238. I believe you introduced the Esparto grass into this country?—Yes.

2239. Have you made arrangements with many manufacturers of paper to supply them with Esparto?—Yes, with the bulk of the trade.

2240. What quantity of Esparto grass is used in this country?—About 40,000 tons were used last year.

2241. Is it used exclusively for paper making?—Yes; I sell a few hundred tons for door-mats and rope—but the bulk is used for paper making.

2242. Does the Esparto require the same amount of preparing for making into white paper as rags, or more preparation on account of the difficulty of extracting the colour?—More, decidedly.

2243. Does it require more soda?—Decidedly, and more bleach.

2244. What quantity on the average is used of ordinary commercial soda ash, per ton?—8 cwt. of soda ash for every ton of paper; the soda ash contains 50 per cent. of real soda.

2245. You use nearly 2½ tons of soda a week?—We use at Eynsham 140 tons a year of soda.

2246. What is the nature of the liquid which comes from the Esparto?—Resin soap, with gluten and colouring matter.

2247. It is a dark brown liquid?—Yes, it is a dark coffee-coloured liquid.

2248. Is the Esparto boiled in coppers?—It is boiled in iron boilers, with a large quantity of water.

2249. How much Esparto is boiled at a time?—My mill is a small mill, and I should say about half a ton at a time, and to that half ton there may be 800 gallons of water.

2250. And 2½ cwt. of soda?—About 2 cwt. of soda ash.

2251. Is the liquid run out from the coppers direct into the river?—We send it into the river—into the mill-tail.

2252. Is a fresh quantity of water poured on to the Esparto in the copper?—Yes.

2253. Is that boiled up again?—Generally, it is so done in the trade—but I do not do that. I can take hot water from my condenser.

2254. You wash it with hot water in the boilers?—Yes.

2255. Is that done more than once?—No.

2256. Then the Esparto is transferred to be broken in the engines?—Yes.

2257. Is that discharge going on all day at intervals?—Yes, according to the quantity of the paper that is made—twice from each boiler a day—or three times, as the case may be.

2258. Where does the discharge take place?—Into one of the water ways—into the tail.

2259. In washing the fibres with the second water, there is not so much refuse coming from the engines?—I think you ought to qualify that term.

2260. Then I will call it alkaline liquid?—Yes.

2261. It also I suppose passes into the water way?—Yes.

2262. What volume of water do you use for washing?—It is very difficult to say. Not so much as in the case of rags, but we probably use throughout the mill from 100 to 150 gallons a minute.

2263. (*Mr. Harrison.*) Is that for all purposes?—Yes.

2264. (*Professor Way.*) Does that include the water power?—No, only washing.

2265. (*Chairman.*) For how many hours do you work?—Practically speaking for 24; the mill is supposed to run for that time.

2266. (*Professor Way.*) Does the Esparto require much bleaching?—Yes, a considerable quantity.

2267. Do you use that bleach with an acid?—Yes, sulphuric acid.

2268. How much bleach do you use in a year?—I use about 130 tons of chloride of lime.

2269. Do you make a solution of that?—We use a solution.

2270. What becomes of the residue?—It is carted away and put on the land.

2271. I suppose the soda is made caustic before you put it upon the Esparto?—Partially so; we boil the soda with lime to deprive it of a certain portion of carbonic acid, and then we run the clear ley upon the Esparto. You are aware that by the time the boiling process is completed, what was caustic is no longer caustic.

2272. Do you suppose that that which you leave as carbonate is active in the process of dissolving and cleaning out the grease and resin?—Not precisely, but it prevents the caustic from being too active.

2273. It prevents the destruction of the fibre, does it not?—Yes, and also the destruction of the gum-resin, and gluten; it would be a destructive agent if it were purely caustic.

2274. In causticizing this soda, what becomes of the waste lime?—It runs into the river.

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2275. How much lime do you use ?—40 tons a year; we use 140 tons of soda and 40 tons of lime, and, in point of fact, the only solid matter, that we run into the river is the lime, and that is in a state of carbonate.

2276. The only solid matter is in a state of suspension ?—Yes, all the rest, which is technically termed refuse, is not so with us; it is resin soap, just the very same as if a woman was washing her husband's shirts and turning the soapsuds from the tub into the river, with this exception, that the resin and soda from the boiling of the Esparto are colored brown, and the shirt soapsuds are uncoloured.

2277. Do you use any anti-chlor ?—Yes, hyposulphite of lime or of soda, but it is not worth talking of, for it can have no noxious effect.

2278. Supposing the chlorine to be in excess in the chloride of lime over the wants of your Esparto, do you take measures to get rid of that excess ?—No, it does not pay. I have known a great lot of fish to be killed when a tank of liquid bleach has burst and gone into the river, but fish do not, as a rule, suffer in our river, unless we put our bleach dregs in, or let any of the liquid chloride of lime go in. I do not believe that the resin and the soda do any harm.

2279. Your bleach is an expensive part of the manufacture, and you do not waste it ?—No, we neutralize that also, as you will understand, by putting in a certain amount of sulphuric acid towards the end of the process and heating it—our last form of bleaching is not quite innocuous, but it is, comparatively speaking, so; the bleach is exhausted. With reference to the liquid that comes from the boilers, I have known at a large establishment of mine in the north of England my cows to drink it, not in very large quantities, but I have known them to drink it.

2280. One of your reasons for avoiding an excess of bleach is, that it would injure the fibre ?—No doubt.

2281. And that probably is the usual reason why papermakers use anti-chlor ?—No, not exactly; the reason why papermakers use anti-chlor is this, in some cases, for instance, for newspapers, it is necessary that the paper should be resistent, so as to hold the type, and we use a quantity of resinate of soda or size, therefore should the pulp, (as rag pulp,) come forward with any bleach in it, it would not take the size, because the bleach would neutralize the resinate of soda, and therefore, the hypo-sulphite of lime or soda is used to neutralize the bleach.

2282. I believe there is no residue from the size, it is taken up by the paper ?—Yes, certainly.

2283. The quantities you have given us for the treatment of Esparto are those which are usually adopted ?—Yes, by five-sixths of the trade.

2284. You have generally instructed the trade in the use of Esparto, have you not ?—Yes.

2285. Have you ever considered the desirability or otherwise of adopting some process for saving your soda ?—Yes.

2286. Have you tried the process introduced by Dr. Richardson of Newcastle ?—No, but he is a copatentee with me ; the process will not answer down here because of the price of coal.

2287. Nevertheless you could work it ?—Yes, we could, no doubt.

2288. But you say it will not answer here as a commercial speculation ?—Yes ; it is not exactly worth while. I am speaking only of my own mill at Eynsham, but I would say the same of three-fifths of all the old mills in England up to the time of the abolition of the duty. They are most of them little out-of-the-way places that have not got facilities for carrying out these processes. If you were to ask me to evaporate at Eynsham I must say at once that I could not do so. I have not room for it. I am isolated there. I have the river right round me. I am on an eyot, and that is the case with two-thirds of the mills in England, except the large newly-established ones. Again, if you asked me to filter, I, and I believe the proprietors of a great many other mills, must say that we could not filter. I certainly could not.

2289. You mean the bulk of the wash water ?—Yes, and also the boiling water. I have no means of doing it, and if it were made compulsory I must shut up, and I know many mills that are in the same predicament. The liquor from the Esparto, as all soapy matter will do, especially when the mixture takes place in a rapid stream, makes a froth, but there is very little of it; what there is is of a dark colour. There is no solid deposit, and the liquid gradually becomes mingled with the other water, and I believe might possibly be a disinfectant, acting upon sewage matter ; at all events, it would not putrify.

2290. Does it kill fish ?—No doubt it would, if you were to put them into a concentrated solution of it.

2291. Supposing it were discharged into the side of a stream or found its way gradually in, would it then have that effect ?—I have noticed this liquor in the stream, and when it has got some distance down you cannot see it. If the river is very shallow you can see it.

2292. When do you think you lose all traces of it ? —A great deal of course depends upon the quantity of water in the river. I should say half a mile down, with an average quantity of water. I do not think it affects the fish.

2293. You say that you do not think in such a mill as your own you could deal with the liquid by evaporation ?—No, on account of expense and want of room. I doubt very much whether I could buy the land necessary for the purpose.

2294. Has it ever been attempted to prepare Esparto grass for manufacture of paper at one place and send it on to mills at other places ?—Yes, I am doing that largely in the north of England.

2295. You have a place where you prepare this fibre and send it to the paper maker, who converts it into paper ?—Yes.

2296. Would that system, do you think, get rid of the complaints made, so far as the river is concerned ? —Yes.

2297. In that case might not the manufacture be carried on at a place where it was possible to recover the soda ?—I am doing that now at my establishment in the North. I shall not waste an ounce of soda where I am.

2298. Then the profit arising from that mode of dealing with the fibres in some central place in large quantities would be greater, I suppose, than if it were distributed over all the mills ?—No doubt of it, but it would be hardly fair to tell a man he must buy his pulp from a central mill.

2299. Is the fibre pressed out by hydraulic pressure ?—Yes, and pressed into a small compass.

2300. Is it then packed in casks ?—No, in bags, by the use of tremendous hydraulic pressure.

2301. Do you think that that system will be extended in this country, with regard to Esparto especially ?—No, I do not think so. It is a specialty. I do it under certain arrangements in my own locality in the north of England, where I have very cheap coal and chemicals at my door, and the grass is brought in my own ships to the door ; I can do it there, but the business will not be gone into extensively by others, I think.

2302. Except by you ?—Yes.

2303. Do you supply the material to paper makers at any distance from Sunderland ?—Yes, one or two, but I also supply manufacturers abroad.

2304. The fibre will bear transportation, and, all expenses considered, your method is not an unprofitable way of dealing with it ?—No, it is a profitable way of dealing with it. I am running my liquids into the river, but it is a tidal river. I am an importing merchant, and I can afford to do what others could not. I do not think it would be a commercial speculation that would answer the purpose of another manufacturer.

2305. (*Chairman.*) Do Scotch paper makers get their material from you ?—Yes, a great many get Esparto from me.

2306. Do you know the paper makers above the

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Water of Leith ?—Yes, all of them. My agent in Scotland is one of the largest manufacturers on that stream.

2307. Do you know that there have been great complaints made as to the nuisance in the valley of the Water of Leith, arising from Esparto grass ?—Yes.

2308. Have there been any actions commenced against paper makers there ?—Not on that stream. There was a compromise come to last year. The Lord Advocate brought in a bill, but I think it was withdrawn, and there was a compromise.

2309. What gases are given out by the decomposition of the refuse that is passed into the stream from the Esparto waste ?—None from the boiling pans.

2310. Have you heard no complaints of anything passed from your mill into the river ?—None.

2311. How long has paper been made from Esparto grass ?—I was the first that made it, in the year 1859.

2312. Are you aware of any process by which paper can be made from pine timber ;—Yes.

2313. Did you ever visit the works in Sweden where that manufacture is carried on ?—No; but that is wood pulp. I have used that pulp merely as an adulterant in our trade.

2314. Is it largely used ?—Not in this country; but to a very great extent in France, Belgium, and America.

2315. What paper do they make of it ?—Common paper.

2316. Can they make paper with it, such as would do for cheap newspapers ?—A mixture they can, for common papers, but there is no length of fibre for it to hold together, it must be blended or mixed with other fibres.

2317. It is pulped up like very fine oatmeal, is it not ?—Yes, it is ground, and passed through sieves ; that process is carried on on the borders of the Black Forest, and in two or three places in Belgium, especially since the rag scarcity has been so very great.

2318. You are aware of what took place as to glass making, that Sir Robert Peel was of opinion that if the duty were taken off glass the trade would then be thrown open, and be established all over the country, but that the contrary has been the effect, for such men as Hartley and other great makers have literally extinguished the small makers in the kingdom ?—Yes, I know that to be the case.

2319. Is it the fact that small paper mills have increased in rural districts, since the abolition of paper duties ?—Most certainly not, quite the contrary.

2320. Has the tendency been to shut small mills up, and to concentrate the trade into the hands of a few large makers ?—Undoubtedly that process is now rapidly going on, and it will end virtually in the extinction of the little mills.

2321. And in the establishment of monster paper mills ?—Precisely.

2322. A large paper maker can be content with a smaller per-centage in proportion to the weight of his material than the smaller paper maker ?—That, no doubt, is the chief cause, but another reason is, that the large paper mills have all been moved to large centres of manufacture for chemicals and depôts of arrival, and little mills, to which carriage of materials is costly, cannot compete with larger ones, especially when profits are cut down as they are now. We have to compete with the foreigner upon a narrower margin of profit than was the case formerly.

2323. As a matter of speculation, have you any notion that paper may be largely used in the manufactures of this country for other purposes than those for which it has been already used, for example, are you aware that they are making pipes with paper ?—Yes, and guns, and backing for armour plates, that is being tried at Woolwich now, and I have no doubt it will answer.

2324. And for building purposes, as in Japan ?—Yes, and I may mention that very nearly every railway carriage on the Great Western line is made of paper.

2325. From what material do the Japanese make their paper ?—I have got all the samples, it is the inner bark of the mulberry tree, or a species of mulberry tree. They do not use any rags, on the contrary they send us rags now from Japan ; articles that they used to burn are now washed and cleaned and sent to England.

2326. They do so rather than use them for their own delicate papers ?—Yes ; all those beautiful papers are made from the bark of a tree.

2327. Do they make paper of a quality equal to that which I now hold in my hand ?—Nothing approaching it, they have no mechanical appliances of the same nature as ours.

2328. The paper which they generally print on is more in the character of tracing paper ?—Yes, like rice paper. The material is very long in the fibre, in fact they use it for pocket handkerchiefs, and for rope and string. If you go into a shop and buy anything the man tears down a strip of paper and ties up the parcel with it just as if it was a piece of string.

2329. Have you seen many of the articles they make, such as work-boxes and other articles, made from their pulp—the papier maché ware ?—Yes.

2330. Is that equal or superior to any of ours ?—No doubt it is superior ; but that is hardly to be called papier maché. I think it hardly comes under the designation of paper, because the fibre has been adulterated with a very large mass of other material; there is some fibre in it.

2331. The exquisite finish of those articles is due to the varnish they use, is it not ?—Yes.

2332. Do you think that the paper trade will be concentrated in large works, and that the material will be extensively used for other purposes than for the ordinary purposes of paper ?—I should hardly like to commit myself to saying that it will be largely so used, but it will be used, no doubt—these things are purely matters of experience. I am told that it answers remarkably well, and I know that at Woolwich the Government are trying the use of paper for backings of armour plates, and are perfectly satisfied with some trials which have been made.

2333. Has the use of Esparto grass tended to reduce the price of paper in this country ?—That is a very difficult question to answer, for there have been so many countervailing influences at work, for instance, the American war and the rag famine, and, as I may say, the foreigner coming in with the cheap watch ; I cannot answer the question otherwise.

2334. With regard to the ingredients which you say are passed into the river, do you think it would be a serious loss in the manufacturing process, if you were compelled to separate the injurious matter ; is there no chemical precipitant for it ?—There is a chemical neutralizer, but hardly a precipitant, for instance, it is precisely the same process as I was explaining just now, when Professor Way asked me whether we used hypo-sulphite of soda, which has the effect of preventing the action of the chlorine on the size. The only way that I am aware of, to neutralize the effect of the liquid, would be by using an acid, but the remedy would be worse than the disease, it would make a froth.

2335. Would any extent of filtration through land separate the materials ?—I do not think there are any to separate.

2336. Would it purify the solution, and so take away the colouring matter ?—No, I believe it might take it slightly away, if you filtered it through gravel and sand and earth ; just according to the amount of filtration, so you would probably diminish the colouring matter, and to some extent there would be absorption of the soda.

2337. Have you ever seen large establishments where town sewage has been put on considerable areas of land ?—No ; but I have read the subject well up.

2338. Are you aware that there are places where

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the entire sewage of a town is passed over land, and where the effluent water has lost all traces of sewage?—Yes, I am aware of that.

2339. The water uncontaminated by sewage passes right into the adjoining river?—Yes.

2340. Do you think a similar process would purify your waste material?—Yes, to a considerable extent, no doubt.

2341. Is there anything in the fluids you use that would be injurious to vegetation?—If diluted, certainly not.

2342. Would it, on the contrary, feed vegetation? —If diluted, certainly.

2443. At a proper strength?—Yes. It is simply soda and vegetable matter in a state of solution. The liquor that we boil the Esparto in is very different from that of sewage, you have not got any fertilizing agent in the one case as you have in the sewage.

2344. No nitrogen or ammonia?—No.

2345. Do you expect that, if the legislature compelled you to filter your waste fluid through the earth, it would be all a dead loss to you, and you would have to provide land and filters, for which you would get no return?—I do not go quite so far as that. I believe it would depend very much upon how a mill was situated. My mill, for example, is situated on an eyot in the river, it is a mere speck there. I have not the resources for filtering.

2346. What sized pipe does your refuse fluid fill while flowing?—A pipe of from 3½ to 4 inches in diameter.

2347. You have necessarily water power and steam power, and supposing you had to lift the fluid 10 or 20 feet, would there be a very large increase of power required?—No.

2348. Are you aware that it is unlawful to pass into streams any refuse from gasworks?—Yes.

2349. You are aware that formerly gasworks did contaminate streams, and in some cases do now?—Yes.

2350. And it is found now that gas can be made without passing from the works any refuse which is injurious to any adjoining stream?—I know that to be the case, for I do it myself. I make gas.

2351. Are you aware that Parliament has recently passed an Act which declares that manufacturers of alkali shall neutralize all the gas that formerly escaped, so as not to pass more than 5 per cent. into the atmosphere?—Yes, I am aware of that.

2352. The last returns show that manufacturers succeed in complying with the requisitions of the statute, and that in fact about 2½ per cent. is the greatest amount that is now passed into the atmosphere. Do you think that if the paper trade is proved to be carried on to the injury of other property, the legislature has a right to interfere to prohibit it?—We must first of all have a proof that it is injurious.

2353. You have stated you do not think that in the way you carry on your trade, you pass into the river anything that is injurious?—I have said that I think there is great cry and little wool.

2354. Looking at the great fact, that the river Thames is the only source at present for the supply of drinking water to the vast population of London, do you think, considering how paper making is now carried on, that it is right that the refuse from paper-mills should be conveyed to London for the inhabitants to drink, if, by any known process, it could be avoided?—As an abstract question, no doubt no person has a right to offend his neighbour, even to turn his soapsuds into any place that might wet his neighbour's shoe, and if it is an offence it is a question, I suppose, how far the legislature would feel justified in interfering; but, in the present position of things, Government would certainly not be justified in closing every river in the kingdom, for if you do that, paper manufacturers must shut up shop.

2355. Every river in the kingdom has not a great city or town upon its banks, and then it must be shown whether water can be obtained from any other source? —No government, I think, would be so mad as to destroy the trade of the country, but I admit it is bound to look to the health of the people, therefore, if it chooses wisely, it will avoid the greater of two evils. If a manufacturer conducts his business carelessly, and wilfully damages a stream, I think the law will always give a remedy. If I annoyed my neighbour, or polluted the Thames, I think I should be open to an action, and I do not doubt that I should have one brought against me.

2356. What weight of coals do you burn?—About 30 tons per week.

2357. What do you do with the refuse ashes?—We have very little, and what little we have we mend the roads with.

2358. You do not tip them into the river?—No.

2359. What would you say of a manufacturer who consumes 1,000 tons of coal per week, and deliberately throws the whole of the refuse ashes into the river?—If I was a neighbouring proprietor, and felt myself damaged, and had any power to exert, I should do my best to stop such a thing as that.

2360. Do you think that Government has a right to step in there and prevent that?—If the local boards have not sufficient power to do so, certainly.

2361. Their jurisdiction ends with the area placed under their control, but a river may continue to run through many counties?—Ashes may be regarded, I think, as refuse blocking up a stream.

2362. And injuring every manufacturer below?—Yes, for instance, I consider that I have a very great grievance to complain of on my river by the proprietor above me taking water away from the river for what he calls water meadows, and returning what water will come back, which in summer is nil; by that I consider I am aggrieved. So if I was to run solid bleach deposit into the river I should be doing people below me an injury, and I should be abusing my right. You know that a very small quantity of lime in suspension would not be felt in the stream, but were it otherwise I should simply damage my own river, and have to dig it out again. But as to the solution that we put in, I maintain that that is innocuous.

2363. (*Professor Way.*) You have been kind enough to put into my hand the specification of a patent that was taken out by you this year; it was sealed, I see, on the 25th of July, 1865, and I observe that in explaining the present condition of the papermaking trade, as to the alkali, you say, "When the boiling process "is concluded, the spent leys are run away to waste; "they still, however, contain in solution the greater "portion of the soda, or other alkaline salt employed, "and also retain in intimate chemical combination "the gummo-resinous colouring and other matter "eliminated or extracted from the fibres in the boiling process; the liquor consequently is very highly "coloured, and a soapy compound being also formed, "it follows that when the said liquors are run into a "river or stream, near which, from the nature of the "trade, a paper mill must necessarily be situated, very "considerable fouling or contamination thereof results, and as this so-called 'pollution of streams' has "lately attracted considerable public attention, should "legislative interference, as would appear probable, "ensue, much embarrassment would be entailed on the "paper trade." Then you point out how, by your process, those results can be avoided. Of course I make every allowance for your having to make out a case for your patent, but is that portion of the specification quite consistent with your saying that there was great cry and little wool?—Not quite; there is a very unfortunate word used there. I think I use the word "contamination," and it all depends upon how we discount that word. I think I have said the "*so-called* "pollution of streams." I have only used the word pollution to make the thing clearly understood; it is not my view of the case clearly, and you must take the context with it.

2364. You mean to say that it is a moot point, whether paper making does cause fouling or contamination?—It is a moot point; a great many people say that there is contamination, but I say really and truly, that there is nothing which can be called refuse put into the stream from paper mills. But if you take up the *ultra* position of stopping everything from going in, and if you stop towns from casting in their sewage, then by all means stop the paper makers and the calico makers.

2365. You have been asked whether the material, if dissolved by soda, would be useful to vegetation?—I think it might be.

2366. You gave, as I think, 6 tons as the quantity of paper that was made from double the weight of Esparto?—Yes.

2367. I suppose that the other 6 tons are principally in the shape of matters dissolved in the solution?—Yes, it might be so.

2368. You use 12 tons a week, and 6 tons now go away in the shape of soda in solution; that is equal to 300 tons of organic matter in a year?—No doubt.

2369. Which might be used for vegetation and be spread over a few acres of land?—Yes, but I wonder how many tons of tallow are passed into the river from the soap that is used in Oxford. I have no doubt that if from any manufactory you collected all the refuse you would have fertilizing agents.

2370. You contribute 300 tons of organic matter to the water of the river in a state of solution, but you think that that is wholly innocuous?—Yes.

2371. (*Mr. Harrison.*) Where is your mill at Eynsham situate; is it below the town of Eynsham?—Our little stream empties itself into the Thames below the town of Eynsham.

2372. Is there any population upon the river immediately below your mills?—None.

2373. Then the refuse that you throw into the river before it got down to Oxford, would be diluted by the water of the Thames?—Precisely.

2374. And you have no complaints made to you of the refuse being thrown into the river?—None.

2375. Are you aware that persons living below Sandford mill have found reason to complain of refuse thrown into the river from that mill?—I have read a letter to that effect, but I think I can explain the reason of that. The people who carry on the business at Sandford mill have only recently commenced, and I believe that the complaints which have been made are entirely due to the circumstance of their having turned up one or two fish, which I know must have arisen from their not having economically employed their bleach, and from having run some of it to waste. I know nothing of the matter personally, but I believe that will be found to be the case.

2376. You have stated that refuse from preparation of the Esparto grass discolours water very much?—It does.

2377. Do you know the Esk, near Edinburgh?—Yes.

2378. Do you know the extent to which that discolouration of the water has been carried there?—Yes.

2379. When the stream gets down to Lasswade, is it not the colour of port wine?—I have seen it rather dark coloured, certainly, but I have at the same time seen a stream without any mill upon it, in Scotland, that was quite as dark coloured; the Esk water is more like water coming from a peaty country. If there was a flood-time it might then have come from the peat. At Messrs. Cowan's mill, at Pennycuik, I can assure you that I have seen the water, which comes in pipes from a place nearly two miles above the mills, the colour of peat water. I am now talking of the pure water they use for washing, it is in rainy weather sometimes the colour of peat.

2380. Has the patent which has been referred to been taken out by you alone?—Yes; but I have got one also in conjunction with Dr. Richardson.

2381. Is that the patent that Messrs. Cowan make use of?—No, they are working a previous patent of Dr. Richardson's.

2382. Are you prepared with any details as to the expense of extracting soda in a pure state from the refuse under that patent?—I am not, and for this reason, that the details will vary greatly. The thing is at present in embryo. It is a mere experiment as yet, and it all depends upon an economical method of directing the works, and upon economical adjuncts, such as coal and lime and so on. It has not been carried out except at Messrs. Cowan's works, and at Esk mill, Messrs. Brown's, it has only been just started, and they know nothing about it at present. Messrs. Cowan know very little about it. I do not think that the managing man could give you any very definite or reliable information upon the point.

2383. They gave us this information that in the preparation of this inferior soda they used two tons of coal at 6*s.* 6*d.* a ton, making 13*s.*, the labour of two men at 2*s.* 4*d.*, making 4*s.* 8*d.*, amounting per day to 17*s.* 8*d.* They gave us, as the produce from that expenditure, 6¼ cwt. (that being 40 per cent. of alkali) at 7*s.* 6*d.*, making 46*s.* 10*d.*, and showing a profit of 1*l.* 2*s.* 2*d.* daily.—I do not think it is right to put coals at 6*s.* 6*d.*

2384. What did you say the value of coals was at Eynsham?—15*s.* per ton.

2385. Taking two tons at 15*s.*, that would be 1*l.* 10*s.* instead of 13*s.* The labour I will put at the same; that would make 1*l.* 14*s.* 8*d.* as the expenditure. Then I presume I must take the produce at the same value, 2*l.* 6*s.* 10*d.* That leaves a profit of 12*s.* 2*d.* even with coal at 15*s.* a ton?—Yes, but you must remember that a large manufactory like Messrs. Cowan's is a very different thing from a little place like this, for, where this small mill makes 6 tons of paper per week, Messrs. Cowan are making their 60 tons.

2386. Could you not retain the refuse until the quantity was sufficiently large to manipulate in this manner?—Doubtless, if I were to put 5,000*l.* or 6,000*l.* more into the mill.

2387. They gave us, as the expense of the apparatus, 300*l.*—Indeed.

2388. (*Chairman.*) What is the greatest weight of paper made at the largest mills you are acquainted with in England?—I believe the largest make that I can speak of positively, is 70 tons per week in England, but there is more made abroad.

2389. Made from what—from rags?—No; they are not pure rags, not a mill uses pure rags now. In 1861 the duty was taken off, and I believe that the largest quantity then made was made by Messrs. Dickenson on the Watford streams, and they made close upon 70 tons a week. More than that is made now. I believe that Mr. Wrigley at Bridge Hall, Bury, makes over 70 tons a week.

2390. (*Mr. Harrison.*) If it can be shown that with coals at 15*s.* a ton, the refuse will after the process of utilization leave a profit at all, might it not reasonably be enacted that paper makers should utilize the refuse?—I think that you would almost be beginning at the wrong end, for, to my certain knowledge, the damage done to the river does not arise from the boiling process, but from the bleach. In old days rags were used containing a large amount of filth, especially when they were obtained from manufacturing districts, such as from Wolverhampton and Bilston. The rags were sold in bags, and when they were boiled, everything went into the pot, and all the grease and foul matter, whether from animal perspiration or otherwise, was all saponified, and found its way into the river; the stream was fouled far more than it is now with this purely vegetable extract. Then you had a large amount of putrescent matter discharged into the stream. The rags were very tender, and when they came into the elaborating process of drawing out into fibre, a large amount of fibrous refuse and solid matter found its way into the river. I have seen it in many streams lying in very great profusion, whereas, in the process of treating Esparto, you do not really lose what I should term refuse—no solid matter—there is nothing but what is in a state of solution. It is organic matter, no doubt, but not as that term is usually understood, animal organic matter. It is in a different condition.

2391. At Rosslyn Castle on the North Esk, a person stated to us that the smell sometimes was intolerable.—That river is very much loaded with mills and the water is very scant indeed in summer. In the water of Leith it is still more the case. There there are 75 mills in a distance of 10 miles. I have seen hardly water enough in the Esk to cover the pebbles.

2392. (*Chairman.*) In the water of Leith river every atom of water in dry weather is used by the mills?—Yes, every ounce of it is measured from the waterworks.

2393. The bed of the river is laid dry, and it is only when they pound it that they have any water to use?—Yes.

2394. (*Mr. Harrison.*) An extreme case is sometimes the best to prove a rule. If there is a smell found on the North Esk, does not that show that the river is polluted by the paper refuse?—I take it that it is quite impossible for any person to attempt to deny that refuse run from a paper mill does pollute clear water, the same as sewage from a town, in the strict sense of the word "pollution."

2395. If it is shown that even at an extreme price for coals, 15*s.* a ton, the refuse can be utilized without loss to the maker, would it not be quite justifiable on the part of the Government to take measures to oblige paper makers to utilize the refuse—their soda refuse?—It is an abstract question; if the Government will serve all the subjects of the realm alike, perhaps so. But I can only answer the question in this way. At my place in the North of England I am taking steps now to use every drop of refuse; but the very day that Government issues a legislative enactment to make it obligatory upon all millowners to do so, I shall shut up my mill here at Eynsham—it will not pay me to keep it on upon those terms. I will venture to say also that something like two-thirds of the millowners occupying either as tenants or owners in fee-simple, will do the same thing. It will not pay them to go on. The profits are now so reduced by the free-trade measures which the Government have adopted in the matter of paper, allowing of undue competition, that, looking at the difficulties connected with mills situated in like districts, and the peculiar way in which they are isolated, I am certain it cannot pay them to utilize the refuse. Hardly a month passes by that I do not hear of a mill being shut up, and I myself have made four or five bad debts this year from mills being closed. It is perfectly hopeless to go to a man and tell him, "You "must lay out a certain sum of money," if he cannot do it.

2396. You have a large manufactory at Sunderland, have you not?—Yes, at a place called Ford.

2397. What quantity of Esparto grass do you use there?—I am going to use about 12,000 tons a year.

2398. While the price of coals at Eynsham is 15*s.* a ton, at Ford you can get coals close to the place at a very low price?—I draw my coals into the mill and into the furnace at 4*s.* a ton.

2399. If Messrs. Cowan, with coals at 6*s.* 6*d.* a ton, can make at a profit, you would make a much larger profit at Sunderland?—Yes.

2400. At Sunderland I believe you are preparing Esparto grass on a large scale for the use of paper makers?—Yes.

2401. In conversation with some of the paper makers on that point, this question was put to them, "May "not this importation of prepared Esparto be brought "extensively into operation?" and they said that it was of importance to use the pulp at the time and at the place where it was made?—No doubt.

2402. (*Chairman.*) You admit that there would be more profit by passing the material at once into the machines?—In a general way, certainly; but much would depend upon local position, cost of carriage, and many extraneous items. I am able to speak positively in contradiction of that remark which has been quoted; and to show you that it is incorrect, I am now supplying three or four first-class mills with half stuff, with which they are perfectly satisfied.

2403. (*Mr. Harrison.*) If an Act of Parliament was passed directing that all this refuse should be utilized, and if it had the effect, as you say, of shutting up your Eynsham mill, would it not, at the same time, transfer the business to your Sunderland mill?—No, it would not affect it at all. I think it is very likely that my best customer for half stuff would be Brother Jonathan—the Americans are the very paper makers we are not frightened of.

2404. Have you had any complaints made at Sunderland of the refuse being turned into the river?—No, it is a tidal river.

2405. You are aware that in a tidal river the water goes backwards and forwards, and Ford is situated considerably above the town?—Yes, it is some distance above, from the main part of the town.

2406. How far does the tidal influence reach?—Nearly to Durham, 12 or 13 miles above us, in spring tides. Vessels of 800 tons burden are launched in the river above me.

2407. There is a large slake above you, is there not?—Hardly a slake, a slake is a muddy bank, this is hardly so; we call it a salt marsh, it is covered with grass; there is very little waste land.

2408. Is it covered with the tide?—Yes, at high spring tides.

2409. Is there any deposit upon it?—Yes, a very large deposit if there is a fresh in the river. The river Wear drains a very large extent like the Tyne.

2410. There is no objectionable deposit upon it from your work?—No, but there is no doubt that a large establishment like what we have there could never be carried out on a river that was not a tidal river—it would be stopped. We do not take the water from the river; we empty a large quantity into the river from springs that we pump from, so that we actually assist the river to a certain extent.

2411. Still the refuse, when it gets into the river, if it was a running stream, would go directly away, and never return, but in a tidal river it must vibrate backwards and forwards?—It vibrates backwards and forwards simply as the salt water in the sea does—it is just the same thing.

2412. One is coloured and the other is not?—I beg pardon, the tide when it goes out is as black as anything that goes out of our place.

2413. Is the tide water dirty?—There is grease in it. I would sooner have the grease of the Esparto water than the grease of the Wear water, when the springs are up.

2414. (*Chairman.*) Do the Fishery Acts interfere with you in paper making?—Not at all. The river at Eynsham is not a salmon river.

2415. Is not the Wear a salmon river?—Yes.

2416. And also the Tyne?—Yes, but no action has been taken under the Fishery Acts. These two rivers are purely exceptional; the inhabitants derive so much benefit from manufactories that they are very much disinclined to interfere. I have seen in the North Tyne river 20 and 30 salmon leap at a time when there has been very little water in it.

2417. It is a fact, is it not, that the salmon run past Newcastle and Gateshead, and also past Sunderland?—Yes, they are found above Durham.

2418. Notwithstanding the impurities in those streams the salmon run past?—Yes, they wait for a fresh in the river, and when it comes, up they go. I suppose the water is then so diluted that they do not feel it, but the quantity of acid that goes into the Tyne is something frightful. The Esparto trade has developed a chemical trade which is carried on largely, and therefore there was not the same quantity of muriatic acid that goes into the river now.

2419. (*Mr. Harrison.*) Muriatic acid is collected in the condensing towers and passes largely into the river?—Yes.

2420. The quantity has been diminished by its being utilized in the preparation of bleaching powder?—Yes, and also no doubt, by the Act that was passed for governing chemical works, and which I forgot to

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direct your attention to—that Act obliged the owners of chemical works to condense the acid.

2421. It has been stated in evidence by a paper maker near Oxford that he would not object to a statutory prohibition against the refuse going into the river?—Selfishly speaking, neither should I, for it would do me a great deal of good, but it is hardly in my province to speak so selfishly as this if the question was how far such a measure would be practicable in trade. I hold a peculiarly isolated position in Sunderland, as I get things so cheap there. But, speaking of the whole trade, the truth is that, as it is, we paper makers are over-weighted. I know several men who have been most cruelly punished by the late measures.

2422. (*Chairman.*) You mean from our government adopting free-trade principles and other governments declining to follow suit?—Yes.

2423. We have given a benefit, but have not received any?—Yes, and unfortunately we have the conviction that the Yankees will never be free-traders. They come and sweep all our markets bare of rags. We are always weighted against the foreigner, even with the advantage of this Esparto material, which is considerable.

2424. Do the Americans avail themselves of the Esparto grass?—No, the carriage would kill them.

2425. Can they not take it as back carriage?—No.

2426. It must be taken as absolute freight?—Yes, it is very cheap in this country, purely because it comes as back carriage—it almost always comes at ballast freight.

2427. That is an incident in the trade which gives you a great advantage?—Yes.

2428. At the present time it cannot go so to America?—No, but the Americans will take the other material—the pulp.

2429. That is in so much less bulk?—Yes.

2430. And of so much more value?—Yes; it is converted by chemicals in this country, and there is a saving of cost of those chemicals and of the *ad valorem* duty that they would have to pay on them when they got to America.

2431. Take a ton of the grass and a ton of the pulp, what would be the relative value of the two?—As 3 to 1; the increase of value in the grass by being made into pulp would be 150 per cent.

2432. When did the repeal of the paper duty take place?—In 1861.

2433. Was it at the same time that the stamp duty was taken off newspapers?—No; that was done some four years before.

2434. What has been the increase in the use of paper in this country since the reduction of the duty on paper for newspaper and printing purposes?—For the period from the time of the stamp duty being taken off to the abolition of the paper duty, we have data; and the yearly increase was something like from 7 to 10 per cent., and from 15 to 20 per cent. in the three or four years. Since the taking off of the paper duty there have been no returns issued.

2435. (*Mr. Harrison.*) The Esparto grass was brought to this country, as I understand, in 1857?—Yes, and it was introduced to the trade in 1861.

2436. It was some years before you perfected the preparation of it?—Yes.

2437. Its introduction was contemporaneous with the abolition of the paper duty?—Yes, and the rag famine.

2438. (*Chairman.*) If there had been no repeal of the newspaper duty, would you have had a chance of introducing the Esparto grass?—Yes, a little; it would have gone on by degrees if the repeal of the paper duty had not been introduced. But that repeal in any case would have had a material influence. But, as it has turned out, it has been the American war and scarcity of cotton which have chiefly helped the sale of the Esparto grass—there is no doubt about that. And many who began with the Esparto as an assistant to rags, now use it by preference, to a very large extent.

The witness withdrew.

Adjourned till to-morrow, at 10 o'clock.

Oxford, Thursday, 9th November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

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JOHN RICHARD CARR, Esq., (72, St. Giles's Street, Oxford,) examined.

2439. (*Chairman.*) You are an alderman of the city of Oxford?—Yes.

2440. You know the state of the city of Oxford?—Yes, I can remember back for 45 years; the population is now about 29,000.

2441. What was the former constitution of the local governing body of the city?—The corporation and the street commissioners are two distinct bodies.

2442. How were the commissioners elected?—So many from the parishes, a certain number from the corporation, and a greater number, I should say, from three to four to one, by the University, the University had a very large majority in the commissioners.

2443. The commissioners had jurisdiction over what sewerage existed and over the street paving?—Yes.

2444. The Local Government Act has recently been adopted?—It has.

2445. In the adoption of the Local Government Act the street commissioners have had their powers repealed?—A part of them.

2446. You have now what is called a "local board of health?"—Yes, it consists of, I think, 16 from the council, one from each parish, 15 from the University; the mayor and the Vice-Chancellor for the time being are members of the board.

2447. The area within which that body has jurisdiction has recently been enlarged by additions of parts of out townships?—By two parts of out townships.

2448. We have heard that the Great Western Railway Company contemplate bringing their carriage and waggon establishment near Oxford, will the site be within the area which is under the government of the local board of health?—Entirely; but I do not agree with Dr. Acland; the ground for the works and the site for the dwellings of the workmen will be very different.

2449. Have you served upon the corporation of Oxford in any former period?—I have been a member of the corporation of Oxford for 14 years.

2450. The sewerage was under a commission, and not under the corporation?—Just so.

2451. Do you know in what condition the sewerage of Oxford is at this day, to what extent the city and its suburbs are sewered, and in what condition that sewerage is?—There is one main drain down St.

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Giles, through Broad Street into the High Street, emptying at Magdalen Bridge.

2452. Do you know the sectional form of that sewer or drain, is it circular or square ?—I think it is an egg shape.

2453. It empties sewage into the Cherwell at Magdalen Bridge ?—Yes.

2454. I suppose there are others ?—Yes, there is one emptying at the bottom of George Street.

2455. Is any portion of the city within your knowledge without any sewer ?—Yes.

2456. Are you aware whether cesspools are in existence to any extent, and if so in which portions of the city ?—Yes, there are cesspools in use.

2457. Into which the slopwater and sewage pass from the houses ?—I am not quite sure about the slopwater, there are open privies.

2458. Standing over these cesspools ?—Yes.

2459. If you were called upon to describe the city of Oxford should you say it was well sewered, or that it was defectively sewered ?—I should not say one or the other, but I should say in my humble opinion what has been adopted for some years is what has been recommended by you and other gentlemen, and is, in my opinion, a very injurious and wrong principle—namely, that of constructing sewers, and emptying everything into the river.

2460. Why do you say it has been recommended by me ?—Because I have the report. This is a pamphlet published by Dr. Child, who has given great attention to this matter ; he is talking about the construction of sewers, and he says " These persons either " never give a thought to the question of how much " the quantity of refuse matter from a dense popula- " tion would amount to in the course of a year, and " what was ultimately to become of it all ; or, if they " did so, concluded, as Mr. Rawlinson declares in his " evidence before the committee of the House of " Commons last session was the case, that the pressing " necessity of the moment demanded the immediate " removal of all putrid and noxious matter, and that " when this had been secured, any mischief which " such removal might produce must be dealt with " afterwards." I should like to explain ; we had a stream called Trill mill stream, and I think I heard you say that, if there was one principle which was settled in engineering more than another, it was that a stream or natural watercourse should never be converted into a sewer.

2461. That is so ?—I opposed the conversion of Trill mill stream into a sewer as long as I could with Mr. Alderman Towle, but we were unsuccessful, and when we were fairly defeated our next object was to assist in carrying out the work. The truth is that that stream is now a great sewer, and empties itself at the foot of Folley Bridge, where I believe that the greatest possible amount of mischief must result by the emptying of that great sewer into the river ; and if you punt across at some seasons of the year you might set the water on fire from the escape of gas.

2462. Have you the idea from the assertion made in that pamphlet that I at any period of my life advocated that rivers should be made the depositories of sewage ?—I take the evidence to mean this, that different towns had thrown all their refuse matter into the river as a necessity, leaving to chance what was to become of the river afterwards. I take that to be the substance of your evidence.

2463. You are quite aware, I suppose, that a text generally has a context ?—Yes, of course I am.

2464. If you take a man's language in part it is very unfair, excepting you can prove that it is a complete statement in itself, if you do not take what goes before and behind ?—We are now committing the same error. I am afraid that we are about to drain Oxford, and send the whole of the sewage away from Oxford, a distance of six miles, without considering what is to become of the sewage-matter, and I am afraid that we are adopting what you in that evidence do not consider, but what you explain as an act of necessity, leaving the sewage-matter to be hereafter dealt with.

2465. Is not this enquiry for the purpose of learning how to prevent the pollution of rivers ?—I see it so stated in the Commission.

2466. You say that you are acquainted generally with the sewerage of Oxford ?—Yes, I have endeavoured to make myself acquainted with it.

2467. You are not a medical man ?—No.

2468. Have you paid any attention to the class of disease which has prevailed in the worst parts of Oxford ?—The greatest attention.

2469. Have you made a visit from house to house during the prevalence of any epidemic disease ?—Yes. At the time of the last cholera attack I was chairman of the board of guardians ; I do not think that a case of cholera occurred but what I saw or which came under my notice.

2470. In what positions generally did you find the greatest number of cholera cases ?—I took a great deal of trouble to investigate the facts, and I believe (and I never believed anything more seriously in my life) that there was not a single case of cholera which arose from open privies. I believe that every case of cholera is traceable to bad water. If you will look at Dr. Acland's map it will show you ; you will find that in St. Aldate's district the greatest number of cholera cases occurred ; there were six in one house. I am old enough to remember when there were not more than two or three houses in St. Clement's east of Caroline Street, when there were not more than two or three houses in the lower part of St. Ebbes, and when in the whole of Beaumont Street and St. John's Street there was not a single house. I can remember when there was scarcely a house beyond the Infirmary, when the whole of this part was a garden (*pointing out the same*). Here the cholera was most severe ; the land was formerly just above the flood level. The ground was raised from time to time by the street refuse, by tan which was manufactured in the neighbourhood ; and when foundations were being dug they came upon skeletons, and there is no doubt that the ground had been an old burial ground. The inhabitants dug their wells about 3 or 4 feet deep and they came to a little stratum of gravel not much thicker than my hand, and perhaps not so thick. If they had gone through that stratum of gravel they would have come to clay.

2471. At what depth was the clay ?—The gravel would be after the soil had been raised above flood level about 4 feet 6, the gravel was not more than the thickness of my hand. All water percolated into these wells.

2472. From that thin vein of gravel ?—Yes, and I believe that the water from Trill mill stream on the one hand, from the river on the other, and the water which fell from the heavens, percolated into these wells. In the case of a family of the name of Lee, there were six cholera cases in one house ; there was no cesspool because they lived on the border of the river. Upon the water being examined I remember it was perfectly filthy, and I have no doubt at all that those cases arose from bad water, and not from bad drainage or from an open closet system.

2473. That is to say in that special case ?—Yes. I will now spread over Oxford generally. On the first visitation of the cholera I was secretary to the local board of health of the parish of St. Giles.

2474. (*Mr. Harrison.*) What do you call the first visitation of cholera ?—In 1832, and at the last visitation I was chairman of the board of guardians.

2475. (*Chairman.*) That is in 1854 ?—Yes, so that one has had the thing continuously before one. In the cases of cholera upon the last attack it is most remarkable, and I will leave with you this pamphlet which will more fully illustrate the facts which I am about to mention. In several small yards and courts where there were open privies there was no case of cholera. In some of the principal houses in the town there were cases of cholera, I believe arising from a defective watercloset system. I believe that by some

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means the gases accumulating in the sewers must have escaped upon their drawing up the watercloset-plug, or by some process which I will not attempt to describe. I can only tell you the facts, and they are particularly enumerated in this pamphlet, which is Mr. Rowell's pamphlet.

2476. Then, according to your experience, you would impute the prevalence of cholera, not so much to cesspools or to open privies, as to drinking foul water and to the gases of decomposition coming back into houses through imperfectly ventilated waterclosets?—That is precisely my opinion.

2477. Do you think that if there were a complete system of sewers properly arranged, and fully ventilated drains and waterclosets, which would take away all this matter now fouling the subsoil and which fouls the atmosphere, and remove entirely from the inside of houses that gas to which you impute cholera, disease might be greatly lessened?—I believe that many districts, for instance, Jericho and St. Aldates, pieces of ground which are of freehold tenure, and the only pieces of ground which the citizens could possess, were built upon without proper attention. The whole of the best land north of Oxford belonged to the respective colleges, mostly to St. John's, and until very lately it was impossible that the city could extend in any way except upon unhealthy soils. St. John's College and, I believe, the University generally have now adopted a more liberal system, that is to say, they have thrown their land into the market. St. Giles's is on a bed of gravel, I do not know how deep; but it is a beautiful shuff gravel; there are two classes of gravel in Oxford, one is the shuff gritty gravel, the other is a gravel of a loamy nature.

2478. (*Mr. Harrison.*) What you call "shuff gravel" contains more pebbles of a flinty character, and the other gravel is chiefly composed of oolite?—Yes, you might separate almost every part of the shuff gravel, it is a broken flint, a sharp decided particle. I believe that St. Giles's, in fact all the north of Carfax, and I may say the north of Christchurch, is on the bed of gravel which I have described as "shuff gravel."

2479. (*Chairman.*) You have very emphatically described St. Aldates, that part of it was something lower than it is now?—Two or three feet.

2480. And you say that human bones and human remains were found pretty generally over it?—Yes.

2481. Indicating that it was a former graveyard?—A part of it.

2482. And you think that parties building there and having formed their wells in that subsoil necessarily drew tainted water?—Yes.

2483. And that tainted water you think was the prime cause which generated the cholera in those inhabitants?—Yes, that was my impression at the time. I gave considerable attention to investigate it as far as I could.

2484. Have you had an opportunity of investigating the seats of cholera in other places than Oxford?—Never.

2485. Have you read much of cholera literature?—No, I confine myself simply to what came under my special notice at the time of the three visitations in Oxford.

2486. Should you be surprised to learn that some of the most dreadful attacks of cholera can be clearly proved to have had nothing to do with drinking foul water?—In the great attack at Washington I see in that pamphlet that every case is clearly proved to have arisen from defective water-closets. I can believe that cholera would be produced by causes other than water. I only tell you what has occurred within my own knowledge. I believe that St. Aldates district might be made perfectly healthy if the parties (and I have no doubt that a great many of them are now taking it in) took in our city water, which water, to my taste and judgment, is nearly as good as my own spring water. I live in St. Giles's street, and there is scarcely a house in St. Giles's Street without a beautiful well of water. Sometimes I drink the water from our railway lake and sometimes the water of my own pump. I believe the inhabitants of St. Aldates district are supplied with city water. If a system of open or closed soil-pits were adopted and the soil could be deodorized with ashes or with some other soil which could be procured, that district would be made as healthy as any place in the kingdom.

2487. Do you know anything of London?—I know London.

2488. Are you aware that London, like Oxford, was a city of cesspools, and that the cesspools have been removed by tens of thousands, and that water-closets have been introduced by tens of thousands?—Yes.

2489. And that the river was fouled to an extent which compelled the Houses of Parliament to shut up all the windows on the river front in 1859?—I was present when quick-lime was being thrown on the banks of the Thames.

2490. I am not an advocate for the indiscriminate abuse of rivers by throwing the refuse into them. But would you be surprised to learn that since cesspools have been abolished and waterclosets have been introduced in London and the river has been so fouled that the health of the inhabitants of the metropolis has improved?—I have no doubt of it, but I do not think that that explains away what I want to show you. I am not an advocate for these soil pits, or that all the house drainage should be drained into them and that all the water from the pump should go into them. I think that a privy should be constructed, and that all the ashes, and only the ashes, should be put into the pit and then removed. The late Mr. Slatter, who resided in the corner house where Mr. Rose, the large stationer, now resides, some years ago had nothing but a common privy. It got full, and he had it emptied; he prepared for a great nuisance. The night came for the soil to be removed, and, to his surprise, there was not a particle of smell. When he inquired he found that the servant every morning had sifted the ashes and thrown them down the privy, and the soil was so utterly deodorized that that was the effect of it. I accordingly am of opinion that a system of drainage to remove surface water is one thing—a system of waterclosets for the better part of the dwellings is another. But I have watched the process of waterclosets among the poorer class, and I find that where waterclosets have been constructed for them upon the best principles which the landlords could adopt, in the winter sometimes we have a three weeks' frost, and the watercloset is frozen up, and there is no privy for the people. Then all sorts of rubbish, potatoe peeling, and other filth are thrown down these waterclosets, so that they are always out of order. And my remarks as to cesspools, or at least open privies, applies rather to the dwellings of the poor, because they will not pay that attention which is essential for the security of a watercloset. Then I would make it imperative upon the board of health to take special charge of these privies and have them cleansed periodically.

2491. Have you ever happened to be in Liverpool or in Manchester, or have you paid any attention to the process in those towns of cleansing these so-called privy cesspools which you are advocating?—No; I have heard of them, but I have never been there during the process.

2492. You have stated that a certain gentleman was surprised to find that his own privy cesspool did not give out any offensive smell when emptied because of the throwing in of ashes. Would you be surprised if I told you that in Manchester there are some 60,000 or 70,000 of these contrivances which you advocate, that they are scavenged by the corporation at a cost of 20,000*l.* per annum, that something like 1200 or 1500 of them are emptied every week, and that that portion of the city which is given up to the "nightmen" is considered impassable by the inhabitants for the time being, and that persons will walk two or three miles round rather than pass through such district, the stench is so abominable?—I know several cesspools in Oxford which are now used and are deodorized in the way which I tell you.

2493. I can, however, show you that the gross cost,

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taking Manchester, is about 20,000*l.* per annum?—And what is the revenue arising from it?

2494. About 10,000*l.*, so that the loss per annum is about 10,000*l.* Look at the registrar-general's return, and you will see Manchester standing in an unenviable position of having from 28 to 35 and up to 38 per 1000 as the annual death rate. You have said that the poor will not carefully use the apparatus of the watercloset when it is put in?—I told you from my experience.

2495. And that the frost disarranges the apparatus to such an extent as to prevent its being used during winter. Would you be surprised if I could point you to entire districts where, in every house in the district, there is nothing but a soil pan, and if I told you that that has been in operation for 10 or 12 years, and that they do not abuse those soil pans as you describe, that they do not freeze up much further north than here, and that the system has worked admirably, and that the death rate has been reduced something like 10 in 1000?—Those are very important facts.

2496. And would you be surprised if I told you that, taking the foulest rivers in England—rivers 20 times fouler than you can dream of in Oxford—medical men cannot attribute to them an increased death rate in the same way as they can to those cesspools and cesspits which are used by the houses of the poor?—I have known the latter thing.

2497. With regard to cholera, I am afraid that you and I will not settle it by any conversation which we have here. Perhaps you admit that I have had an opportunity of seeing cholera on a much more extended area than has been attended to by yourself?—All that I am anxious to do is to prevent the city of Oxford—with your assistance, if you can assist us—spending 40,000*l.* to throw all the sewage of Oxford into one focus. You have given us an instance where one town was perfectly healthy because it was situate on the south of a bad locality, and you have mentioned that another town was unhealthy because it was situate on the north of a nuisance. They are about to concentrate the whole of the filth of this town to the south of Oxford, and if there is anything at all in your experience, what they are about to do is simply to ruin Oxford for ever. Sandford is about five miles straight down to the south of Oxford.

2498. You see how dangerous it is to take part of a person's statement and draw conclusions as if it was the whole?—But I only took what you gave me.

2499. Allow me now to give you something further. In both those cases the sewage went out in a corrupt and putrid state and fouled the ditches and the rivers of the district, causing whatever evil influence there was in it to extend itself to the atmosphere?—Precisely.

2500. But in the event of Oxford being sewered according to any recommendation of mine, there would be no sewage remaining beneath the city for 12 hours. It would be delivered at its outlet with perfect freshness; it would go without any tanking or intervention or any storage immediately on to agricultural land?—Yes.

The witness withdrew.

Professor Phillips, F.R.S., F.G.S., &c., &c., &c.

Professor Phillips, F.R.S., F.G.S., &c., &c., &c. (Museum House, Oxford), examined.

2501. (*Chairman.*) You have paid great attention to geology?—Yes.

2502. You are acquainted with the geology of the Thames generally?—Yes.

2503. Are there any peculiar features in the geology of the Thames valley that you should say made it exceptional as compared with other river areas in England?—There are, I think, some peculiarities in the sources of the springs and the flow of the water.

2504. From those springs?—Yes.

2505. In what stratification do the waters of the Thames rise?—The Thames rises in what is usually called the Bath oolite and lias series. Take, for example, the country above Oxford. There are 5 orders of springs, but of very unequal value. The lowest of them spring from the bottom of the marlstone, which is a thin bed of rock in the lias, and the next spring from the base of the inferior oolite and come out at the very top of the upper lias, the lias being an argillaceous deposit that throws out the springs. A third rank of springs comes out from what is usually called the great oolite rock. Then there is another set of springs which come out from a thin band of rock called cornbrash, thrown out by what is usually called "Bradford clay" in the south of England. And still there is another group of springs which come out from the base of the coralline oolite series, thrown out by the Oxford clay, below that rock. There are few great springs generally in the part of the valley about Oxford. In the lower part there are more springs.

2506. What is the order of the stratification below Oxford?—Here we stand upon the Oxford clay, and at Sandford the coralline oolite series sinks down to the water, and after that at Newnham the Kimmeridge clay which comes over the coralline oolites, then lower greensand, and between those there are more springs; after that, further down that valley you have the gault, that is what you see in the country about Wallingford; after that you come to the upper greensand, which is not well exhibited, and then the chalk.

2507. Does that take you down to the London basin?—Yes; that takes you down to Maidenhead; you have then the usual succession of plastic clays, London clay, Bagshot sands, and the ordinary gravels and deposits which lie upon them, but very little of springs there, except near the surface.

2508. Looking at the generally clear character of Thames water, I suppose every formation that you have mentioned would give more or less of lime to the water?—Yes, all those that I first mentioned.

2509. (*Mr. Harrison.*) The marlstone?—Yes; that will give lime also, it will almost in all cases give some carbonate of iron; there is not so much iron out of the upper springs; it is chiefly from the marlstone, but little from the oolite; then, when you come to the lower greensand you get iron again; there is not much iron in the series of the coralline oolite, the cornbrash, or the great oolite springs; the lower green sand will give some iron.

2510. Every person must observe that the Thames, as a river, carries down exceedingly bright water; the ordinary flow consists of bright water?—Yes; I think that may fairly be said; with regard to the branches, perhaps some distinction should be made; there is the Evenlode, which is the branch of most importance near Oxford; it comes down near Charlbury, and I think might be regarded as the least bright of the Thames sources.

2511. What mineral contaminates or colours that water?—The Evenlode flows over a very large extent of lias clays, and it gathers springs from the marlstone; but before that water is delivered into the River Thames, the stream flows over a large extent of clay ground, and the little floods which that small stream makes have been a good deal quickened in their movement by the straightening of the courses, and if you examined the water I do not think it would appear so bright, or not always.

2512. (*Chairman.*) There is no area connected with the Thames basin of any extent that peaty water comes from?—No; not in the streams above Oxford; I think you can hardly find any; below Oxford it would be rather different.

2513. Do the lime and the iron or any of these formations give "sulphate of lime," "gypsum," or those crystals of lime that are found in the lias, namely, "alum shales"?—Yes; because of the abundance of bisulphate of iron in the clays, there will be traces of

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sulphate of lime; the quantity would however be very small from the oolitic springs.

2514. Do any of those deposits give the coprolite taint or phosphate of lime?—No, not any of them; but every bed of the oolitic rocks contains phosphate of lime in very small quantities; in agriculture it is a very important element.

2515. Is it in quantity sufficient to give a perceptible character to the water?—No; it would be seized, as fast as it gets into solution by rain in the soil, by the plants.

2516. Do you consider that we have in nature any source of fresh water other than from evaporation?—No; none at all.

2517. Many educated persons speak and conceive subsoil water as something created in the bowels of the earth, and think that they have only to tap the subsoil to get what they choose to term "an inexhaustible supply." Are you of opinion that that is based upon truth or upon a fallacy?—I think it is based upon a fallacy; as a general proposition you might find a special local example in which for a long period there were small quantities of water pronounced inexhaustible; in a general sense I should regard that as nonsense.

2518. One may take it, I presume, that springs consist of one continued round of evaporation and condensation by dew and rain, a spring being the lip of a natural basin pouring out the surplus water, and so long as that order of nature exists it will be possible to draw a certain amount of water from the subsoil?—Just so.

2519. If anyone contemplated drawing what they chose to term an inexhaustible quantity of water over and above the volume of rain falling upon that area, the volume only percolating through the subsoil, they would exhaust the stratification?—Certainly.

2520. Just as you might empty a tumbler, so you might empty any stratification; it is a question wholly of volume?—Certainly.

2521. The volume depends upon the capacity for holding the rainfall?—Yes, and the peculiar character of the rocks.

2522. Because a subsoil such as chalk connects itself with the ocean, that is no argument in favor of the inexhaustible nature of the fresh water supply?—I think not, certainly; no argument at all.

2523. The natural process of springs I suppose we may take to be this; the water evaporated from the ocean falls upon the surface of the earth, passes by filtration into the subsoil, and fills up the pores within that subsoil; and then the outpouring of any surplus water goes by springs into rivulets, and into rivers, and may also to an enormous extent flow out below the sea level into the ocean?—To a considerable extent; but I am disposed to doubt the great amount of the flow under the sea from chalk on account of impediments which intervene in the passage of water. It is in fact a stream of water that always is moving from the hills, say, in Hertfordshire; a little gets into the chalk and it moves on, but one person dams it up in its passage here, and another pumps it there, and the sum total that is lost is considerable; there would not be much spring water finally delivered into the sea, but some would be, no doubt.

2524. (*Mr. Way.*) The converse of that would hardly take place?—No; I think the total discharge into the sea would not be very great, because there is a very curious fact, although it is well known now, as to the relative level of wells in any given district; for example, in chalk or oolite there may be springs and wells in the same country drawn from the same showers of rain passing through the same rock, but at different levels on account of friction; this is a real impediment to the actual movement of water; in rocks water may be supposed to be always moving on under the influence of gravity; but the result is to be regarded as a hydraulic effect, and not as a hydrostatic effect; of course the other is included in it.

2525. (*Chairman.*) I believe water necessarily takes the character of the subsoil or subsoils through which it filters or out of which it flows?—In using the word "subsoil," I dare say you would intend it to include all the stratifications through which water goes, although it is very often used technically by agricultural folks, who, when speaking not exactly of solid rock, call it the subsoil, and say that the subsoil plough goes usually deep enough to penetrate the second layer, but they would be scrupulous in letting it go down to the truly solid materials.

2526. I would use it in its extended sense of subrock down to the lowest water-bearing stratification?—That being understood I am rather disposed to think that it would be unsafe to put the proposition except with some cautions, because rain water as it comes down from the heavens, containing some carbonic acid and sometimes a small trace of chloride of sodium and ammonium, when it reaches the soil experiences, in passing down the first 6, 8, 10, or 12 inches, many reactions, and some solids are dissolved by this rain water, and they are separated again as the water proceeds, so that it is rather a complicated case; I believe there is no absolute certainty that rain water will always take up the quality of the subsoil finally; but it will retain a trace of all the chemical operations to which it has been subjected; in a general sense, if the rock is limestone, the spring water will contain carbonate of lime.

2527. Or sulphate of lime?—There is very little sulphur in these oolitic limestone rocks; it occurs in some of the forest marble beds; in almost all the clays there is a little sulphate of lime formed, and also a little bi-sulphide of iron, from which you would get a formation of sulphate of lime. That being allowed for, the water not coming much out of these clays, but from the tops of them, Thames valley streams do not therefore contain much though they do contain some sulphate of lime.

2528. If an intelligent traveller, such as Livingstone or Barth, travelling a country that no European foot ever trod before, saw a river coming down from an unknown region, do you think it would be possible so to instruct him, that by an examination of the very simplest character he might predicate the stratification from which such river water was coming, by its colour?—If you give him the aid of a thorough good rain or thunderstorm, so that he might see the washings, he would get some good notion of it I daresay; that might in many cases be satisfactory.

2529. Would it not be correct to say that if a river of full volume came down of a fine rich coffee colour, you had there soft water, containing a vegetable tinge from granite, clayslate, millstone grit, or other analogous formation?—Yes; but I should infer that the stream undoubtedly had drawn its colour from the vegetable substances which, in its course, it had, in great abundance, to wash, especially the peaty substances that are found in all parts of the series of stratifications up to the Bagshot sands. Even among the mountain limestones in Yorkshire peat is also found; the reason is, that these limestones are mixed with sandstones, shale, and sand, so that peat sometimes even grows over limestones.

2530. Suppose the exposed and washed stratification is principally limestone, is it not the character of lime to throw down any vegeteble matter or vegetable tinge; in other words, if there is an extent of limestone sufficient to give 10, 12, or 16 grains of bicarbonate of lime to each gallon, is it not the character of lime to throw down any vegetable tinge, and so brighten the water?—Yes, I have no doubt that it would have that effect *pro tanto*; but I think the distinction is this, that brown river water is in no sense spring water, and that limestone water is in no sense flood-water, they are two distinct things; spring water or limestone water will be of a pure colour, but if there comes a heavy rain falling on limestone, of course, in ordinary soil, it will bring down abundance of foreign matter. In such a case as that you would be obliged to filter the water and separate it into two parts, containing the calcareous sediment and the peaty discoloration. I may mention that an observation

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of the colour of river or lake water would often be strictly, in the sense that you mean, indicative of the character of the springs. Every person who goes into the limestone district of Western Yorkshire, and examines the waters there that come from the limestone, will find that they are beautifully clear, but when they are collected into little wells they always appear to be green. If they are not green-looking you may be sure that there is some impurity mixed with them, and you may observe the same thing in the water here where it is calcareous water.

2531. The river Thames passing over the stratifications you have described brings down, as I said, ordinarily, and when not in flood, bright water?—Yes.

2532. And I think we may also go a little further and say, that for a river of its extent and volume, a singularly pure water?—Quite so, beyond containing some mechanical impurity.

2533. The tendency of lime and iron is to throw down that which would corrupt the water, is it not?—Possibly. I do not feel so sure about that, but I feel more sure of this, that there is very little in the river water to be corrupted; the water is all filtered by nature. Every one of these springs is filtered water.

2534. May we not take it that the dry weather volume of the Thames, or its summer flow, is essentially spring water?—Quite so.

2535. May I inquire whether anyone has presented you with an estimate of the quantity of the ordinary flow of the river Thames? Yes. I have made myself a conjecture only. I have measured the velocity of the stream, and I find that it is surprisingly small; the velocity is so small that my friends have been quite astonished at it. People commonly expect rivers to run as fast as a racehorse, but I find that the Thames in dry weather flows at a rate of about a foot and a half in a second, or about one mile in an hour; it is as much as it does to flow at the rate of a mile an hour near Oxford when the water is low. I have made an estimate of the quantity of water, and my conjecture is, that the water flowing in the Thames by Port meadow in the driest season of the year will yield 50,000,000 of gallons per day.

2536. Are you aware of the effects of land drainage within any period that you can name?—Yes; within a few years I have seen the effect of deep draining upon clay lands, in the lias country, and on the oolites; it is considerable.

2537. What has been the effect?—It appears to me to be one that requires rather careful analysis before coming to a conclusion upon the subject. Of course, we all hear the opinions which have been so commonly expressed, that in consequence of this new system of drainage, which has only come into much operation in the last 20 years, the discharge of water down our valleys has been accelerated. It seems to me that it is requisite to speak of these things under two heads. First, the effect of mere surface draining can be seen in the valley of the Evenlode, (open drains, the ancient mode of draining,) and also the old plan of throwing up the land into high ridges by ploughing, (this also is an old mode of draining,) at the same time a good deal has been done in this valley by straightening the drains and cleaning the ditches. As far as that open draining is concerned, and as far as it relates to the clay country, there is no doubt that the descent of rain water is accelerated, that, I think, is what strikes an ordinary observer. But if you take a different case and speak of deep drains in the same clay, I apprehend that the effect is exactly the contrary. What happens? Suppose the drains are 4 feet deep, the immediate effect of having a drain is to open little fissures to the surface, and those little channels keep receiving surface water as it falls, and thus are formed artificial springs. The effect is, instead of the rain water running off rapidly from the surface of the clay ground, that it drains down below the surface, and is retarded only by the length of time required for it to pass down those little cracks, and even to run through the little drains; it is in fact increasing the area of the infiltration of the water, and increasing, relatively, the amount of the springs as far as it goes. Those deep drains retard very much indeed, in proportion to their area, the descent of the great body of rain water; and I think that those two cases should be kept separate, and the same argument should never be applied to deep drains as to open surface drains.

2538. You mean that we should take into consideration the character of the drains?—Yes.

2539. Whether by open channels or by pipes in the subsoil forming artificial springs?—Yes.

2540. You bring the soil which previously resisted the infiltration of water into the condition of an absorbent stratification?—Yes, you make an absorbent rock, and a very extensive one.

2541. (*Professor Way.*) Which equalizes the flow?—Yes, very much indeed. I thought the Commissioners might ask me a question about artesian wells.

2542. Have you any artesian wells in this part of the country?—We have had trials made for water; several persons have bored down to very considerable depths, and as far as Oxford is concerned I think I may say, that if it should be thought fit to try any experiments here to get water from great depths, we must count upon going at least 600 or 700 feet before we should reach the limestone rocks which would bring the water down from the country to the west probably; that I believe is the fact, so that it is not very likely that we shall have artesian wells sunk here. There have been two great borings made in this neighbourhood, but always with the same result; it is most likely that under our feet is a subterranean bed of water, in the oolites below.

2543. Do you know the artificial well at Grenelle?—Yes, I have seen it.

2544. That I think is about 1,700 or 1,800 feet deep; is the water drawn from the green sand?—Yes, they go entirely through the Paris basin series, they go through the chalk into the greensand.

2545. Is it not proved that by deep sinking of that character, if you get water in the wells, the probability is that you will have the different salts and lime and other matters, which are soluble, from the rocks in a greater proportion than from the shallower wells?—I believe that is a fact very generally understood, and I have been told by a person of merit and knowledge upon the subject, that in most of the very deep wells, the water is found to contain a small quantity of carbonate of soda.

2546. The notion, that you have only to sink deep enough to get water anywhere, is not borne out by the geological facts?—Certainly not; very many of our collieries are so dry under ground, that they have to take down water to water the gangways.

2547. The water at Grenelle comes up with a temperature of about 81° Fahrenheit from a depth of 1,700 feet?—Yes.

2548. The stratification at Monkwearmouth at the bottom of the shaft, 1800 feet down, is also about 81°?—The temperature has increased since I was in that shaft; but an experiment that we tried at a depth less than that you have mentioned, about 1,600 feet, gave us 73½°. I am told that since that time the temperature has increased. I should hardly have thought that experiments so carefully made as ours were would have given quite so great a difference. The general rule is one degree of Fahrenheit for 60 feet of descent. In Lancashire it is rather different, not quite so much.

2549. The deep-seated wells formed in the rocks such as at Bath and Buxton have a temperature very considerably higher; do you think that that is a test of the depth in any degree, or are there any causes other than depth to account for the temperature?—I think it is principally depth.

2550. Upon the artesian principle the surface water passes down through fissures and rises again as through an inverted syphon?—Yes.

2551. The water from the Buxton well which comes

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up with a temperature of about 81° is very seriously influenced in volume by the seasons?—I believe so.

2552. Are the wells at Bath influenced in a similar manner?—I believe not at all.

2553. Not in volume?—No; nor in temperature.

2554. Then what would you infer from that, that they receive the water from some great subsoil basin?—Yes.

2555. That equalizes the surface supply, and in a measure makes those wells independent of that surface supply?—Yes; it makes the discharge perpetual, and it makes it equal. I believe the cause is, that the mountain limestone, in all that surrounding country, is greatly broken by enormous fissures, and that from all the mountain limestone of that district the Bath waters receive a supply which comes up from a very great depth—the stratifications are the oolites, the lias, and the new red sandstone, over this mountain limestone—I think that that is the true cause of it. I believe there is no change of temperature and no change in quantity.

2556. Then the temperature is due to some fixed cause, as the depth and volume are to the capacity of the fissures?—Yes; a large extent of receiving surface.

2557. The water comes up charged with a certain amount of carbonate of lime?—Yes; but the analysis is rather complicated, it contains several things.

2558. I will take such a quantity as is found in the Thames water, that is to say, from 14 to 16 grains of carbonate of lime to a gallon, and that necessarily is from the wasting of the rock with which the water comes in contact?—Yes.

2559. That produces the known characteristics of limestones, wide fissured joints?—Yes.

2560. And that necessarily, so long as the process goes on, increases the extent of the receiving area for any in-flowing water?—Yes, and facilitates the descent of it.

2561. And increases the sub-reservoir room?—Yes, quite so, in the very deep parts, towards the surface, and, in fact, everywhere through the limestone beds.

2562. Does it not also set up a system of underground channels, which may extend to very considerable distances?—Yes; but I might mention a very curious example, which is well known in the north of England of a river which runs underground—it enters the limestone and the limestone joints are so open, that the river tumbles into them, and only finds its way out after two or three miles underground flow, and if you attempt to look for the channels, you find that they are so numerous and so tortuous that you really have a subterranean reservoir made by Nature, of an enormous extent—the same thing occurs in Somersetshire, and practically the observation which you have made is perfectly borne out by these natural examples.

2563. In the valley of the Thames there are large areas in which the lime is being worn away by the action of subterranean waters?—Yes, no doubt of it, and to a very large extent; if we could get under some part of the Cotswold Hills, I have no doubt that we should be able to walk for many miles along the subterranean channels.

2564. That is one of Nature's processes of degradation? Yes, it is going on, and with time will ultimately carry it all away. I thought the Commissioners might be disposed to ask me a question as to the desirableness in some future condition of the Oxford valley of attempting to equalize in some degree the great inequality of the streams here during dry weather and the wet; although it is not so great as in other places, yet it is great enough to cause, occasionally, some inconvenience in many parts of our district. During a dry summer, some of these springs fail utterly, and, as I have mentioned already, they are now coming out in a dry season from several of the zones I have mentioned. Under the coralline oolite, the springs very often fail. Under the cornbrash it is the same. It has occurred to me, as the difficulty has very frequently presented itself, whether now is not the time to consider the question of making artificial processes by which to economize in the summer time the very scanty springs, which would be sufficient, if you could collect all the water from them; at all times of the year, there would be enough for agricultural purposes. The want of water presses very much in particular districts where the case is worse, for we know that during the last summer persons had to go many miles to obtain water. Some friends of mine, who live near Wychwood forest, found that all the wells failed in certain villages; they deepened some of them, but that was of no use, and that I think would be a country in which they might, by having a reservoir carefully constructed, economize water of wet periods for their whole summer supply. You will probably some day or other look into that question more carefully.

2565. That is to equalize the excessive rainfalls by surface storage?—Yes, in some cases, and in other cases I think it would be a good thing to consider whether subterranean tanks could not be introduced for limited supplies of water. I have known that done by one of my relatives, who was an engineer; he made an arrangement of that kind at Scarborough—that is, he made a subterranean reservoir, which has proved of the very greatest importance, the water of a little spring was economized in that way, and it was found to be a very great service.

2566. Did he drain the stratification?—Yes, he made a subterranean cut, kept it carefully closed up, and stopped it. The result was, that the water was supplied regularly through the year, and it was found to be a very good plan. The demand for water here by-and-by will be so great and will be felt to be so oppressive, that some method of this kind must be introduced.

2567. Was this subterranean reservoir made by means of excavation, or by means of damming up the head of the spring, so as to fill up more of the pores of the stratification?—Both of those methods were followed.

2568. (*Chairman.*) Are you aware that in the storage of water, if you had to obtain a volume of water by excavation, the cost would be more than equivalent to the advantage gained?—That is a practical question. I daresay it might be so at this particular time in many situations, but I think there are some cases in which the demand for water is so great, and the supply is so important, that very great expense would be justifiable in securing it.

2569. If the storage of water is provided for, and a conduit pipe is laid, the ordinary gravity of the water will carry it to the consumer, and as each gallon weighs 10 lbs., the saving of human power may be easily calculated as between the water running to the place where it is wanted and an individual having to go once to the place and once back again, carrying in his hand, if a gallon, 10 lbs., and so on, for each additional gallon 10 lbs.?—Yes, and I am persuaded that some day or other a method of the kind which I now propose will be followed out. I imagine a farmer in a clay country, where there are no permanent springs, to be in great difficulties in respect to water in the summer time, and I propose that he shall make a spring for himself, and the way to do that is, to have a portion of the surface, properly shaped, hollowed out, and arranged with gravel and sand. It would not require a large surface, so that water should be collected from the rain in an artificially prepared natural filtering apparatus. It would be perfectly easy to compute what area would be required for any volume required. If so many thousand gallons, you must have an area of so many hundred feet. I believe it has never been tried, but I am confident that it would be possible to make a spring for a farm in any country with clay ground sufficient for farming purposes. The other day, when I was going over the Cotswold Hills, I saw several square miles with not a drop of water, and I came to a very deep well where they were pumping water, but they had to carry it to the cattle for which it was wanted, or they had to drive the cattle to it, and they had to

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get it with very great difficulty. In such cases I would suggest the making of artificial springs.

2570. (*Mr. Harrison.*) It has been stated before a committee of the House of Commons that there is a danger of the water in the Upper Thames failing in consequence of the land drainage. Do you think that any extent of land drainage that has been already carried out, or that is to be carried out, will interfere with the deep drains that supply the springs and which are the sources of the summer supply ?—No, I think not.

2571. You have been referring to subterranean passages in chalk in the oolites, and in limestones generally. Do you not think that without any surface excavation a heading may not possibly be made into a subterranean natural reservoir ; for instance, if a deep well is sunk through the lower chalk between this and Nettleby, where I daresay you are aware the land is waterlogged, and the water rises to the surface of the ground, that well would soon be filled with water, and from the well, if culverts were made, the water might be carried in different directions, passing through pipes in sufficient quantity to supply even a large town ?—Yes, I quite understand you.

2572. Do you consider such mode of obtaining a water supply is possible ?—I suppose it would depend very much upon the assurance that we should have as to the extent of the natural subterranean channels, or artificial conduits. I suppose they are merely regarded as supplemental.

2573. The object would be to tap and collect the water ?—Yes, and I believe it would be of the greatest importance. I think that it is astonishing that wells are finished without making any headings right and left to cut the natural stream, as if that were done, it would increase the quantity of water. With regard to the first part of the question, as to making a natural reservoir effective by some artificial addition, that is a most important matter to consider. I believe that there are many cases in which the natural basin could be raised in its level; so raised as to cause it to serve as a reservoir for a longer time.

2574. If the river Thames, at a certain point, is an outlet for the water flowing gradually through the chalk, there is a water line within the chalk ?—Yes.

2575. It rises to a considerable height for a certain distance, and under certain circumstances the water appears at the surface in the form of springs, and runs down into the river by channels, and in other places it appears in the form of waterlogged soil ?—Yes.

2576. It can only get out in one of those three ways, either by a spring at a high level, by appearing at the surface in a waterlogged condition and evaporating, or by flowing out at a low level to the Thames, or other lowest point of exit ?—Just so.

2577. That shows, does it not, that there is a large natural subterranean reservoir for the water ?—Yes.

2578. And to that extent it might be calculated upon ?—Yes, quite so.

2579. The water from that natural subterranean reservoir might be abstracted by artificial means, might it not ?—Yes.

2580. Without interfering with the constant supply ; in fact it might be the means of regulating it in the way you have proposed, for if it were drawn off to a lower level in summer, there would be all that quantity to be filled up by the floods in winter more than is usually done ?—Yes, the power of regulation is the point to which I direct my mind. The saying is that, "As the days lengthen the springs strengthen ;" and "as the days decline the water contracts." It is in about the month of September that the springs in all this country are at the minimum, and that is as regular as possible ; the quantity keeps changing as the measure of the time required to pass down from the surface to the place of efflux. Therefore if you regulate the time you regulate the quantity at any period.

2581. Considering the immense size of impounding reservoirs which are being built for the supply of large towns, and the great danger which would result to the inhabitants living below them in case of their bursting, of which we had a fearful example near Sheffield, does it not appear to be desirable that some experiment should be made to ascertain how far it would be possible to make use of natural subterranean reservoirs in preference to artificial reservoirs above the surface of the land ?—I think I should be very much inclined to do so, for I believe that very considerable advantage would arise from it. I would begin by selecting some small spot in the country, and making an experiment upon it. It would be requisite to choose a spring, of which the discharge was known to be very unequal, and there to make some experiments. All that would be required would be to raise the level, by means of which there would be a great increase in the subterranean reservoir, and then to have some power to adjust the discharge.

2582. Would not that same thing be done if you tapped the reservoir at a lower level ?—Yes, that so you regulated it.

2583. I mean without any surface work to tap the water at a lower level than the spring taps it at ?—Yes ; that is the same thing in substance ; you would do what I mean, which is to take advantage of the natural cavities which exist underground, and use them as the regulating reservoir.

2584. From your knowledge of the whole subject, do you think there is a probability of some scheme being devised to take advantage of the natural reservoirs in the oolite, limestone, and chalk formations that will be beneficial for the supply of towns ?—I think so.

2585. (*Mr. Way.*) With regard to peat and hard water, I believe where you find peat you never find hardness ?—I think not.

2586. Whether the Chairman was right or not in saying that hard water, chalk water, for instance, will precipitate a vegetable colouring matter, is it not a known fact that peat and water containing lime, so as to be hard, are seldom met with together ?—They are incompatible.

The witness withdrew.

Dr. Greswell stated that the river Isis had been allowed in the course of 20 years to destroy 20 acres of the best part of Port meadow ; that of those 20 acres, six were lost beyond all possibility of recovery, because they were always covered with water, but that 14 acres were still capable of being partially recovered.

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Mr. THOMAS FRANKLIN (of Sandford Lock) examined.

2587. (*Mr. Harrison.*) You are lock keeper at Sandford ?—Yes.

2588. How long have you been lock keeper there ? —About 17 or 18 months.

2589. When where you employed before you went to Sandford lock ?—Before that for a short time I was in the Forest of Dean sinking.

2590. You have not been upon the river, have you ? —Yes ; regularly for 30 years.

2591. In what capacity ?—I was captain of the "Brimscombe" boat down to London.

2592. You know the river Thames then from Lechdale to London ?—Yes, every inch of it.

2593. Since what period have you known the river ? —The last time I was down with a loaded barge was about 14 years ago.

2594. How many years before that had you been upon the river ?—I should say 40 years.

2595. You have therefore known the river navigation in its prosperity and as it declined ?—Yes.

2596. Can you give us any information as to the number of barges that used to navigate the river Thames as compared with the number which navigate it now ?—I know that from Oxford there were upwards of 20 big barges that worked alone from Oxford to London.

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2597. How many barges used to come from Lechlade?—About 12.

2598. Regularly?—They used to have Welsh goods as well as Birmingham goods.

2599. Did Birmingham goods come in that direction?—Yes, by Gloucester. They came to Brimscombe port, and then by the Thames and Severn Canal.

2600. Used you to find any difficulty in the navigation between Lechlade and Oxford?—Sometimes we used to stick, but not often, in Port meadow, at what they call Oxford Common.

2601. But not above that?—There are some rocks in Port meadow; sometimes also we have stopped a few hours at Newbridge, but not long. We never lost a flash till we came into Port meadow stream.

2602. Have you been in the habit of purchasing flashes of water to carry you down?—Yes.

2603. Have you purchased them at more than one of the locks?—We have brought the water from Lechlade, and that used to take us all the way to London; going night and day; we never stopped.

2604. At each succeeding lock they kept the water you had brought from above until you got there, and then they let it out to carry you on?—In low-water time we sent a man a-head two days before to shut this water in, and sometimes he went down as far as Benson.

2605. Did you experience any difficulty from the millers using that water?—Not at that time of day. The millers were then as agreeable to draw the water as we were to receive it.

2606. Do you recollect whether during that period the commissioners dredged the river so as to keep it at a proper depth?—I never heard of dredging, but I know they did a good deal of ballasting, four men in a boat.

2607. How many men did the commissioners keep so employed?—I think 16, and there were 4 men in each boat.

2608. Have you ever stuck at any time in any of the locks on the river, not being able to get out in consequence of the water on the sills not being sufficiently deep?—The only obstacle was Sandford old pound.

2609. That is the one which Alderman Towle has purchased?—Yes, I believe so.

2610. There is now a new pound with a deeper sill?—Yes.

2611. How much deeper?—I should think about four feet deeper.

2612. Since that was built has there been plenty of water for barges to pass?—Yes, provided that there was water to go below. It was wanted to get out of the pound at ever so low water, but not far below, unless the water was properly drawn at Sandford.

2613. To give a kind of flash over those shallows?—Yes.

2614. Do you remember there being any pound-lock at Newnham?—Yes.

2615. How many years ago was that removed?—I think 45 years. I have been out drawing it many times with the Abingdon men.

2616. When that lock was there, was there sufficient water on the sill of the old lock that Alderman Towle purchased?—It used to assist there very much.

2617. Was there water over those shoals that you mentioned just now below Sandford lock?—Yes, that used to give water all the way up. It headed the water up about six inches at the old pound.

2618. Did you experience any difficulty after you got out of the lock with your boats in getting over the shoals immediately below the locks?—There was a ferry there at that time of day.

2619. Where was that ferry?—Down about 50 yards below Sandford lock; and when that ferry was done away with, it was ballasted out by the Commissioners. They never stick there now.

2620. Do you remember the shoal below the lock at Caversham?—Very well. I have been on it many times.

2621. Do you remember the commissioners taking any steps to reduce that shoal or hill?—No, it was out of our district. It used to be a bad place both up and down.

2622. Can you tell us what amount of money you used to pay at the different locks?—Twopence a ton.

2623. Upon what you carried?—No. The big barges were rated at 128 tons, at the same time they would carry about 150 tons.

2624. You paid *2d.* a ton to the commissioners?—Yes.

2625. How much did you pay to the old lock owners?—At some places more, and at some less; it was more than half I know.

2626. You have been, you say, 16 months at Sandford lock, as lock-keeper?—Yes.

2627. During that time have you observed any floods passing down the river?—We had one last season, but not much of a one.

2628. Did the water rise so high below the lock as to be nearly even with the water above it?—No.

2629. What was the difference between the two?—Five feet I should think.

2630. Did you at the same time go up to Iffley lock?—No.

2631. Can you give us any information that will be useful respecting the navigation?—All the information I can give you is as to those locks, those are the difficulties we have to contend with, and the fact is that in low-water time, when the barges require water, you cannot get it; although men will go into the west country 10 or 15 miles to bring water, when they come to Sandford mill, the miller refuses to draw, and the barges are left behind. When the miller at Sandford does draw, sometimes he only draws about half his sluice and sometimes a whole one, sometimes he will not draw at all.

2632. If the water is not up to high-water work, is he obliged to draw?—The high-water mark has nothing to do with the navigation, it was for the protection of the fields and meadows. Years ago, when we got the water down to Sandford, no question was asked about how high it was, or how low it was, we drew it when it was at the highest breast, and then no word was said about the time, or about the height of it.

2633. You mean by that, that the navigation was of first importance, and any rights of the miller were of second importance?—Exactly.

2634. The navigation had a right to the water before the miller?—Yes, always.

2635. Was it so from as early a period as you can recollect?—Yes; there was never any difficulty about drawing the water.

2636. What sort of mill was it at Sandford at that time?—It was a flour mill.

3637. Were the waterwheels of the same description as now?—No, they were not so large as they are now, they have under-thoroughs in now, that is to draw the tail water back.

2638. Can you remember how the waterways were cleared at Sandford for letting the flood-water out?—It was all open when the lock was drawn then, now they have got posts in to fix the sluices to; the posts occupy, I should say, one part out of four of the waterway.

2639. Were any complaints made by the inhabitants of Oxford when those posts were put in?—I do not recollect. There used to be two large sluices 50 yards above that, but those were done away with in Mr. Swan's time.

2640. How many years ago was that?—Thirty years I think.

2641. Is it within your recollection that the level of the tumbling bay at Sandford has been altered?—They have raised it. Mr. Swan raised it at first, and t man has continued it ever since by putting on planks, one of nine inches, I think, on the top of the old lasher. Many years ago we used to shoot our punt down there, because the barges took up so much room.

2642. Did you not destroy the punt?—No, but we sometimes used to go out three parts full of water;

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there was such a long sweep, and the stern in shooting will pitch before the head runs up, and we frequently got three parts full of water.

2643. How much have they raised the water at Sandford by raising that weir?—That is shifting the weir; I am speaking of planks being put on the old one, about nine inches in depth.

2644. The water at Sandford a day or two ago was above high-water level?—Yes.

2645. How many inches during this flood is it above high-water level?—This morning it is about four inches.

2646. Do you know how many inches there are upon the sill of Iffley lock when the water is 4 inches above high-water mark at Sandford?—No.

2647. How much lower than high-water mark does the water stand sometimes at Sandford?—It is very irregular; sometimes of a Sunday we have it to 8 feet 4 there, that is on account of the mill standing shut; then at other times we have got it at about 6 feet, and sometimes a little less, it is generally from about 6 feet to 6 feet 6.

2648. When the water is only 6 feet, can boats go from Sandford and enter Iffley lock?—Yes.

2649. There is plenty of water over the sill at Iffley lock?—Yes.

2650. Have you ever known any difficulty to occur there?—No, I was never stopped there.

2651. Is there any other information you can give the Commissioners that you think will be useful to them?—I do not know of anything in particular.

2652. Perhaps you will describe particularly the kind of boats with which you used to shoot that lasher?—They were punts, rather bigger than a common fishing punt.

2653. You took the punt with you for the purpose of taking the horse across the river, I suppose?—Yes, not only for that, but for laying the lines through the bridges in coming back.

2654. What sized barge did you navigate?—150 tons.

2655. How long did it take you to make a trip from Lechlade to London?—Those big barges did not go to Lechlade, but barges of 80 and 100 tons used to work to Lechlade; a barge of 80 tons would go all the way to Brimscombe, but not a barge of 100 tons.

2656. How long did it take a barge of 100 tons to go from Lechlade to London and back?—That would depend upon the loading at London; sometimes it would be done in three weeks, sometimes in a month, and sometimes six weeks. I have made the voyage from Brimscombe to London and back in three weeks and a day.

2657. In what sized barge?—80 tons.

2658. Have you made any observations as to the height the water rose above Sandford, and how many feet it rose below Sandford at the same time?—Yes.

2659. (*Chairman.*) Does the miller at Sandford catch any fish?—Yes.

2660. What kind of fish?—Eels.

2661. What weight of eels do you think he takes in a year?—If he had got good tackle he would have caught, this last flood, 10*l.* worth of fish.

2662. What weight of fish would that represent?—I cannot exactly say what weight, but he caught 81 eels, and they only stopped one day before the eel-traps were washed all to pieces.

2663. What sized eels were they, what weight?—From 3 lbs. to 4½ lbs. a piece.

2664. Which is the best part of the river for fishing?—I should say it was at Cleve, below Wallingford, there is a long deep reach there all the way from Benson.

2665. Do you know whether the river has silted up in any part or whether the hills have increased?—No, there are hills about the river no doubt, and it has not been anything till lately.

2666. Do you think that the river has silted up?—It is said to have grown up with every little rise of water. Benson was a very bad place for the sand to get up.

2667. Can you mention any places in the river where you used to find obstructions to the navigation, and where your boat used to stick?—Yes.

2668. Starting from Lechlade downwards, just mention the places at which your boat used sometimes to stop for want of water?—There were many places where it stuck for a short time, till the man went down to shut the weir in properly. From Lechlade we got on very well until we got down to Radcott, and from there we got on very well until we got down to Tadpole—it used to be rather difficult—and then down to Newbridge. There it was a middling sort of place, and we used to work it over with the horses; we generally stuck. Then we found no difficulty till we got down into Port meadow. The dredging machines would clear all that out in about a week.

2669. Were these places a short distance below the weirs?—Yes.

2670. Going farther down below Oxford, will you mention what other places there were?—Then there were not so many locks on the water as there are now. There was never a lock to shut in below Maidenhead when I first went there.

2671. Will you just mention the places from Oxford downwards below Port meadow where your passage was impeded?—The first place where the barges stuck below Oxford was what they called Clifton ferry. Then they went on very well oftentimes, unless you lost your flash, and that was not until we got down below Staines. Then we used to get into troubled water there, as there were no locks to keep the water up—a place called Laleham gull.

2672. Were there any places below that?—Yes, Chertsey Bridge Hill.

2673. All that is put to rights now, is it not?—Yes.

2674. In carrying your flashes down from Lechlade, have you ever known them flood the adjoining lands, so as to do mischief to the hay of the tenants?—No, I never heard them complain, although I know that sometimes the water has been a little out; but I never heard any complaint made.

2675. Have you known the water rise so high that it has flowed over the banks?—Yes, for a short time, and when it was drawn it would be off again directly.

2676. Would it find its way over the bank and go right across a field?—No; it went in at some low place and came out again at some other low place some way down.

The witness withdrew.

Mr. J. B. Spearing.

Mr. JOHN B. SPEARING examined.

2677. (*Mr. Harrison.*) You are a land agent?—Yes.

2678. Do you reside in Oxford now?—Yes; I resided for 12 years at Montsford, between Wallingford and Streatley. I held a large farm there.

2679. What is the nature of your business now?—I am a land agent.

2680. Have you had to carry out much land drainage?—Not a great deal of land drainage. I may mention that I wrote the Royal Agricultural Prize Report on the Agriculture of Berkshire.

2681. In what year was that?—In 1860, and in that I state in several cases how grass land is injured by the flooding of the Thames, it being an injury, not only to the crop in summer, but by lying too long on the land also in the winter. It destroys many of the most valuable plants for some years afterwards, and the pasturage is not so valuable as it might otherwise be.

2682. Over what extent of the Thames have your observations extended?—I think the whole length of the Thames as far as Berkshire is concerned—more particularly from Reading to Wallingford.

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2683. That is chiefly through the chalk district?—Yes.

2684. With the gravel and alluvial soil on each side of the banks of the river?—Yes.

2685. What has your experience been of the effects of flooding over that district?—I consider that the floods do a great deal of damage by lying too long; they would benefit the land very much if they went off quicker, but by lying too long they destroy the plants—that is, all the more tender grasses. If the tender grasses are for more than eight or nine days under water, they die away, they cannot stand it; but for seven or eight days I do not think the floods injure them; they recover.

2686. Are they benefited if the water stays upon them for a shorter time?—Yes, I think so.

2687. After how many days would the land be benefited by the water lying upon it?—Four or five days.

2688. If the time were extended to seven or eight days it would do no mischief; but when it lies on the land from eight to 10 or 12 days, it would be mischievous and destroy the tender herbage?—Yes.

2689. Do you say this from actual observation?—Yes, it is based on actual observation and my knowledge of the value of land.

2690. Is it consistent with the same view that the maintenance of the water at a high level, so as to be within a few inches of the surface of the soil throughout the summer, is an advantage to the grasses?—Yes. I have no doubt that if the water could be got up to within a certain distance of the surface, it would very much benefit the land.

2691. At what height below the surface of the soil is it desirable to maintain the water?—Eight or nine inches below the surface. If the water in the summer time could be got within eight or nine inches of the surface it would very much benefit the pasturage.

2692. Have you sank wells at any time a short distance from the bank of the river?—Yes.

2693. Is the water in those wells the same height as the water in the river?—It is, in the Thames valley.

2694. So that if the water was kept up to within a foot of the surface at the river, it would be within about a foot of the surface right across the valley?—Yes, particularly where there is drift and gravel.

8695. How does that accord with ordinary drainage where we try to drain the water two or three feet below the surface?—In those soils that require much drainage there is more clay, it is a wetter soil, and the wells in this district I do not think are regulated by the height of the river.

2696. Have you observed the roots of the grass plants, and to what depth they grow below the surface of the soil?—Not particularly; but the coarser grasses grow deeper than the finer ones.

2697. The finer and more valuable grasses do not strike so deep as the coarser and less valuable grasses?—No.

2698. May we take it from your evidence that the roots of the fine grasses, which it is most desirable to cultivate, would not go deeper than 12 inches below the surface?—Not more than eight inches I think.

2699. So that they would obtain all the benefit of the water without any mischievous consequences?—Yes. With regard to drainage, in every instance in which I have been connected with draining, or the carrying off of any water, I have always objected to draining into the Thames, knowing that it would be a very serious question some day. I have therefore always cut off sewage from the Thames.

2700. Have you sewered any towns?—Not to any great extent. At Wallingford, when I was Vice-Chairman of the Union, the question of the drainage of the workhouse was being discussed, and it became necessary that we should do something, inasmuch as the health of the inmates was considered to be affected by the bad drainage; it was proposed that the drainage should be carried into a ditch or sewer that would eventually find its way into the Thames, and there was a good deal of discussion about it; eventually I prepared a plan according to which the drainage was to be dealt with, and that was carried out, and I do not believe it has been 5*l.* expense since the year 1854.

2701. Was there much fall?—A very slight one; we had some land in hand, and we use our own manure, and everything is turned to account.

2702. That is to say, you carry the sewage from the Union House on to the land?—Yes, to a garden.

2703. Have you found that the results have been beneficial?—Yes. Mr. Clutterbuck was one of the guardians at the time, and he said that the water in the neighbourhood was very superior in consequence, for previously there had been privies and sewers about the place which affected all the water in the wells about the house.

2704. Have you filled those up?—Yes, we have filled up all those places.

2705. And then the water in the wells was found to be very much improved?—Yes.

2706. Were the wells sunk down into the chalk?—Down into the lower chalk.

2707. Are you acquainted with the river above Oxford?—Not with much of it, simply from just going over it, when I wrote that report. I went over the whole district then.

2708. Do you know the river immediately below Oxford towards Iffley?—Yes, about Sandford.

2709. Have you observed the plants and grasses growing in the meadows there?—Not very closely. I have had to put a value on some of them, but I never did so immediately after a flood.

2710. How much do you think that land, now subject to floods for 10 or 12 days, would be benefited if the water could be kept off it?—At least 10*s.* an acre.

2711. How much would it be benefited, if you could not only keep the water off at will, but also let it on to irrigate the land for a short time?—Nearly to the extent of another 10*s.*, so that land which is now worth 2*l.* or 45*s.* an acre, would be then worth 3*l.* 3*s.* or 3*l.* 10*s.* per acre.

2712. Dr. Greswell has removed the water from Port meadow, and you say that the clearing the meadow of the water would increase the value of it by 10*s.* an acre, and further if you were able to irrigate it at pleasure its value would be still further increased by 10*s.* an acre?—I am not prepared to speak of any place above Oxford; meadows there would not be so valuable as the meadows below I think; between this and Lechlade, and above Oxford, lies Oxford clay, and I do not think that the pasturage on that is, as a general rule, so valuable.

2713. Are you aware that there is generally a bed of gravel forming the sub-soil?—I did not know that.

2714. Supposing, as has been given in evidence before the Commissioners, that there is a bed of gravel for the sub-soil, would you then consider land above Oxford was similarly circumstanced to that on the lower part of the river, and therefore would be equally improved?—Yes, equally improved; but then again of course it depends upon the rent that is paid for the land. When I speak of 10*s.* an acre, perhaps some land is rented high, and some low, and therefore to show one at a high rental only would not do, but, as a general rule, it would be improved 10*s.* an acre.

2715. Have you executed much drainage?—Not a great deal here, but I have done some in Ireland.

2716. You are chiefly acquainted with the chalk formation?—Yes, and the upper green sand.

2717. In the chalk generally is it of any use to put in drains?—No, it is injurious.

2718. I presume they would have no effect?—Not the least, they would only at times carry off the water when really you wanted it.

2719. Do you know the neighbourhood on the opposite side of the river to Wallingford, where the lower chalk and the green sand crop out?—That is near Didcot, you mean on the Oxfordshire side?

2720. Yes.—I do not know that part.

2721. Do you know the part on the Berkshire side,

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where the lower chalk and the upper greensand crop out?—Yes, I know that neighbourhood.

2722. Does the water come to the surface in the formation in that neighbourhood?—I have been there only in the summer, and I have not been able to form an opinion. There is one thing that I wish to refer to; when I was speaking of the effect of floods I should have said that they are very different in winter from what they are in summer. I have seen great damage done to the land in summer time from flooding, and then, particularly about me, the flood leaves a scum on the land, which renders the land almost useless, for the produce of it is very inferior, and I have heard the farmers in Reading market making complaints to the millers for not running off the water and floating their hay.

2723. If the weirs were properly constructed, would it be rendered almost impossible for the water to flood the land?—I consider it would.

2724. Would not that be a better system than leaving it in the hands of the millers to be able to flood the land?—I think so. I believe it would pay any company to buy up the mill property on the river.

2725. (*Professor Way.*) I gather from your evidence that what the proprietors on the immediate banks of the river want is to be able to keep the water out when it would be injurious, and to be able to use it when they want it?—Yes, and in that case I think they would not hesitate to pay for it.

2726. Seeing that that would be a very considerable benefit to those persons so located on the banks of the river, can you form any notion what section of the river or area that would extend over?—It would vary very much, but I should say from half a mile or a quarter of a mile on each side to a mile. There is a good deal of arable land before you come to Reading which is very much injured by the water of the Thames.

2727. You have stated that keeping up the water under the roots of the plants to a certain height, within eight or nine inches, would be a benefit in the summer time?—Yes, if it got nearer at times, say within 4 inches, it would be a greater benefit.

2728. You do not mean water that is merely lying under those roots, but water that is actually passing in the river?—Yes, but I think it would be immaterial what it was, if it did not remain there too long.

2729. In point of fact you would call that a species of subsoil irrigation?—Yes.

2730. (*Mr. Harrison.*) Has it come within your knowledge that there is any passage of the water from the chalk hills through the gravels, and in that way to the river adjoining?—All water I think finds its way into the Thames in our district from the chalk hills, or the greater portion of it; I am speaking of the land immediately adjoining to Wallingford. We are on the lower chalk, and, of course, it is not so deep as further up.

2731. We are given to understand that there are springs from the chalk into the bed of the river?—That is only in some places where the plastic clay has not been removed. The plastic clay still remaining on the chalk, the water cannot find its way into the chalk in many instances, and then the water finds its way into the river, but if I took the trouble to break through the crust of the plastic clay, the water would be drained off immediately. I know several pieces of land that are wet on chalk hills, and if they would break through the plastic clay and let the water into the chalk, there would be perfect drainage.

2732. We have been given to understand that the water percolates through the chalk, and comes into the bed of the river in very many places; do you know anything of that?—No, it is contrary to my opinion. I do not think it would.

2733. Having lived close by the river for many years, do you know anything about ground ice in the bed of the river?—I have observed it particularly. I used to keep an account of the rainfall and the temperature, and I have always noticed ground ice, but never except when the river was full, and the stream swift. Then it could not freeze on the surface, the temperature was generally below 16°, and then the ground ice would form in all the sheltered places where the stream was at all broken.

2734. At what depth was the ice formed below the surface?—At almost any depth. There are several places above Wallingford railway bridge where the stream is obstructed by islands; the water not being able to freeze on the surface, freezes on the bottom, and large blocks of ice form, and then go down the river.

2735. You have observed this?—Yes, frequently.

2736. When this ground ice rises, does it bring anything up with it?—Portions of gravel.

2737. Have you noticed any chalk?—No, but I have noticed pieces of gravel.

2738. Adhering to the ground ice?—Yes.

2739. And it is carried forward by it?—Yes, I never noticed chalk.

2740. What thickness has the block of ice been?—Between three and four inches. There was such a quantity on one occasion that, having a little bridge, I had to employ a man to keep the ice off, or it would have carried the bridge away.

2741. Was that ice of a peculiar structure, so that you could not possibly mistake it for ordinary ice?—I am satisfied that it came from the bottom of the river, taking the gravel with it when it broke away.

2742. (*Professor Way.*) Does this occur in deep water?—I think it is when the temperature of the river is cold enough, but the water runs so fast that it cannot freeze on the surface; in a quiet place it would form.

2743. May there not be in these quiet places back water, so that the surface water is carried underneath for mixture?—I do not know.

2744. You know that water very rarely freezes at the bottom, except in shallow places?—I cannot speak to that.

2745. (*Mr. Harrison.*) It is in consequence of the water constantly flowing that it cannot freeze at the surface; all the water is reduced below freezing point?—Yes, I have never seen any bottom ice unless the temperature of the air has been at least 16° below freezing point.

2746. Below Wallingford there is a beautiful deep reach stretching towards Goring?—Yes.

2747. Have you any idea of the cause of the very great depth that is found in that reach?—No, but the deepest part runs for nearly a mile, and there is a place called Runsford, which is the deepest part I am told between London and Oxford.

2748. What depth is it in the summer time?—I cannot speak positively to that, but I know it is sometimes 14 or 15 feet deep; punting with a pole you are scarcely able to reach the bottom.

2749. Do you know whether those places have deepened or not within the memory of any person?—Not to my knowledge.

(*Mr. Castle, engineer to the Thames Commissioners.*) I have heard it stated by Drake, the pound keeper at Day's lock, that frequently in the winter, when there has been no sign of ice on the surface of the water, he has taken up his fishing poles from the bed of the river, and found them coated with ice, having gravel and weeds adhering to them. He has also found a similar thing to occur when he has placed a punt pole in the river during a night when there has been frost; there is no ice to be seen on the surface, but when he draws his pole he brings up ice with weeds and gravel adhering to it from the bottom.

2750. (*Professor Way.*) In what depth of water?—At a point where it would vary from 4 to 5 feet to perhaps 10 or 12. In addition to that he states that the sill of Day's lock is frequently coated with ice when there is none on the surface, having 3 or 4 feet of water upon it.

2751. (*Mr. Harrison.*) Do you think that the ground ice with the weeds and gravel adhering to it being carried away may have partly been the means of forming the deep channels and reaches?—I do not think it would be in sufficient quantity to have that influence. I think the quantity is so insignificant, I believe that

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the ground ice would form anywhere where the river was at all quiet.

2752. At a depth of 20 feet ?—I do not think it signifies what the depth is, I do not think there would be much difference in the temperature of the water.

2753. The velocity of the stream would be the least where the water was deepest ?—Yes.

(*Mr. Spearing.*) I wish to mention that the Thames below Wallingford has been a great nuisance from the quantity of dead animals that are put into it. I should say that every animal that died in Wallingford was thrown into the Thames.

2754. Have you no local authorities to prevent that? —There is no one who would take the trouble to do it. In summer time you cannot go a mile on the river without finding a dead pig or dead dogs in the water, and the stench is abominable.

2755. (*Chairman.*) Is it the duty of no person to pull them out and bury them ?—No, the carcases go into the rushes on the side of the river.

2756. (*Mr. Harrison.*) What are the local authorities about ?—There seem to be none.

2757. (*Chairman.*) There are parish authorities I suppose ?—Yes, but they do not interfere with that sort of thing.

2758. One may take it, I suppose, that there is no scavenging of the Thames ?—That is it, and in consequence there is a great nuisance, particularly in the summer time.

The witness withdrew.

Mr. James Castle further examined.

Mr. J. Castle.

2759. (*Mr. Harrison.*) You were kind enough to lead us down the Thames to Oxford, the other day, giving us a description of the navigation ?—Yes.

2760. Will you be good enough to proceed in the same manner, with a description of the Thames and the works upon it ?—Respecting Oxford itself I have heard certain questions asked of the witnesses in reference to the water levels immediately in this neighbourhood. I am certainly of opinion, from what I know of Oxford, that it would be most desirable if the levels in this immediate locality could be reduced at least a foot, and I think that in any plan for regulating the Thames that is a point which should receive very serious consideration. It would affect several mills; but they are small mills, and comparatively insignificant.

2761. (*Chairman.*) Which are those mills ?—There are the Oseney mill, the Castle mill, the old Waterworks mill, the Weirs mill, the Hincksey mill, and the Iffley mill. I am now speaking exactly of the neighbourhood of Oxford.

2762. Would you not take Sandford ?—I should take Sandford as I came lower down, it is not in the immediate neighbourhood of Oxford.

2763. Could the levels be lowered without interfering with Sandford ?—Yes, but of course that involves the destruction of the mills above.

2764. They are above the level of the Sandford water ?—Yes.

2765. (*Mr. Harrison.*) With regard to the level at Sandford, when the water is at high-water mark at Sandford lock, what is the water on the sill at Iffley lock ?—Four feet four inches.

2766. What depth do you require for the navigation at the sill of Iffley lock ?—We require in the winter time and the autumn, for a heavily laden barge, between 3 feet 10 inches and 4 feet of water; not less than 3 feet 10 inches for the barge itself.

2767. Then if the water at Sandford were reduced 6 inches below the high water mark it would lower the water on the sill at Iffley lock to the minimum at which you can maintain the navigation at ?—Yes, to the minimum at which a laden barge could work.

2768. Therefore there is a difficulty on that account in lowering the water at Sandford lock ?—Yes.

2769. That would point not simply to the miller as a barrier at Sandford lock, but to the navigation commissioners as well, would it not ?—Yes, it would point to the Navigation Commissioners as keeping the water at that high level, but the complaints which have been made to you, and which I can pretty generally confirm with regard to the flood being penned back upon Oxford, point entirely to the miller and not to the Navigation Commissioners.

2770. In consequence of what ?—In consequence of his mill banks being solid instead of being partly constructed as waste weirs.

2771. When was the pound lock at Nuneham removed ?—I have no knowledge and never heard, until a witness made a statement here to-day, that there was any person living who recollected the existence of that lock. But I began to think from hearing that evidence to-day that possibly when the new lock was constructed at Sandford the old lock at Nuneham was removed, upon the supposition, perhaps, that there was no longer a necessity for it. Still I can hardly understand that, because several reports are in existence, which were made by my predecessors, upon the shallowness of the water upon Radley Common, between Sandford lock and the position of the old lock at Nuneham. I believe that I stated in my evidence when I was examined before that I had dredged the bed of the river at that place, and had found that the water went down in proportion to the dredging. No amount of dredging deepened the water there. There is an old report of one of my predecessors dated 1835, and I find that he performed the same operation and that it had exactly the same effect. Some 12 years ago dredging was performed there, and then the same result occurred.

2772. So that, although they lowered the lower sill at Sandford when they made the new pound, they did not lower it sufficiently to make the navigation complete between Sandford and Abingdon ?—Quite so.

2773. Had you continued to lower the bed of the river at the point in question, you would at the same time have lowered the water upon the sill at Sandford, so that you would have injured the navigation?—Yes, probably that would have been the case.

2774. Will you proceed with the river downwards ? —At that point in flood time although the floods may upon the average be from 18 inches to 2 feet deep, between Oxford and Sandford, there is very little or no flood upon Radley Common, and the water very seldom rises so high as the level of the banks upon the Berkshire side, except in an extraordinary flood. Above Nuneham House there is some low land, but it is not flooded to anything like the same extent as the land above Sandford; consequently I think that that portion of the land does not get its proportion of the flood water which is complained of.

2775. You think that the flood water might be sent down past Oxford out of that district, without doing any injury to the adjoining lands ?—It would do no injury there; but if it were sent down in a volume over the fields it would be discharged upon Abingdon with very injurious effects.

2776. How would it be if the side channel at Abingdon were opened out ?—That would almost entirely relieve the town of Abingdon. That was at one time a navigable channel, now there is a place upon it formed into a boat house which at one time was one of the old turnpikes upon the river. I am not able to describe what a turnpike was; but my opinion is that it was a similar construction to that which forms the lock at Folly bridge, probably some gates to open it, with moveable tackle at the other end; there was at one time a turnpike at this point and now the middle part which should have allowed the flood water to escape has been built up with solid masonry.

2777. So that it is no longer a flood channel ?— Yes; I do not know by whose authority it was done, or whether the Thames Commissioners took any notice of it.

2778. Did you ever take any levels upon the river

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between one lock and another?—No; I have never had occasion since I have been connected with the Thames to do so; it is a point to which I have always looked forward with great interest; but generally my time is so occupied with watching repairs and other matters that I have not been able to devote any time to that.

2779. Have you ever observed when the water rose a certain height, at Abingdon lock, for instance, what height in proportion it rose at Sandford lock?—No. There is some difficulty in getting down below Radley Common to Abingdon in flood times, as the towing-path is generally under water from the railway bridge to Abingdon.

2780. As that length between Sandford lock and Abingdon is not much flooded, it would be an interesting point to make some observations. Could we not have the lock-keepers at those two places to observe carefully through the winter the height of the water above the lock at Abingdon, and below the lock at Sandford?—Yes.

2781. Will you for the commissioners put two gauges at those two places, and endeavour to have those observations made?—Yes, I will, if I have time, attend to it myself. I may say that the water rises to such a height at Abingdon lock that it runs over the top of the swing beams, and it is impossible to open the gates; that always occurs in a high flood.

2782. How is the level of the water below the gates at Abingdon?—The fall is about 4 inches per mile between Abingdon and Culham, the next pound.

2783. Immediately below is there much of a fall?—I cannot speak with any accuracy; but I believe the fall is about 10 inches per mile in the reach below Culham.

2784. Will you be kind enough to proceed from Abingdon. At Abingdon you have the River Ock coming in?—Yes.

2785. And the Wilts and Berks canal?—Yes. That I believe it is proposed to fill up.

2786. The traffic is so small that it no longer pays to keep it open?—Yes, it is no longer of service. At Culham there is a very dangerous lock, which is now undergoing some repairs, but I am afraid that they will not be completed until we get low water again.

2787. Have you observed the leakage of the water through the pound lock at Culham?—Yes.

2788. What proportion does the leakage bear to the whole volume passing down the river in the summer time?—In the summer time the leakage would not be so great as it was when you saw it, perhaps; because generally there are boards or temporary appliances of some kind tacked on the gates, to prevent the water escaping; still the leakage lately has been very great and I think, that just before you saw it two of the sluices were blown out from the upper gates.

2789. Is there sufficient overfall for the flood water at Sutton Courtney?—I think that Sutton in that respect is perhaps better off than many other localities. There are three old locks which perhaps you have seen at Sutton on the mill path, which present a curious union of interests. All the solid construction at those locks belongs to the Commissioners, and it is part of their duty to repair it, but the moveable tackle belongs to the miller and he has the sole control over it.

2790. Is it generally the case that the miller has control over the moveable tackle?—Generally, but there is no uniform rule; where there is a weir with no mill, there the control entirely belongs to the Commissioners.

2791. Are all the weirs in the hands of the millers? No.

2792. Do you know of cases where they belong to the Commissioners?—Yes, there is a side weir at Folly bridge which belongs to the Commissioners; there are two sluices at Iffley which belong to the Commissioners, there are the locks of which I was speaking at Sutton, which belong to the Commissioners; there is a weir at Clifton which belongs to the Commissioners, that weir is placed across the old navigable stream to divert the water into the canal upon which the lock stands. At Day's lock the weirs are in connexion with the pound, and they are not attached to a mill; they are held by the Commissioners upon a lease, and are considered part of the navigation property. Then lower down at Chalmer hole, near Wallingford, there is a weir which belongs to the Commissioners.

2793. Is that where there is no mill?—Yes. At Sonning there is a portion of a weir which belongs to the Commissioners. At Hurley there is an old lock which belongs to the Commissioners, and a weir that is of considerable length. At Cookham there are three weirs which belong to the Commissioners. At Bray, at Boveney, at Romney, at Old Windsor, and at Bell's Weir there are weirs which belong to the Commissioners.

2794. Are those weirs generally at pound locks where there are no mills?—2 or 3 of them are.

2795. Where there is a mill the weir and other appliances for passing the flood water are in the hands of the millers?—Generally. At Bray the weir is not connected with the mill, and the same at Boveney and Romney. The mill at Clewer is at a distance, but the Boveney weir pens the head of water for Clewer mill.

2796. Is there much expense attending the construction and keeping in order of these weirs and overfalls for the flood water?—Yes, a considerable expense.

2797. Can you compare that expense with the expense of maintaining the pound locks of the Commissioners?—The maintenance of a weir would be very much more costly than the maintenance of a simple pound lock, especially a lock of good original construction.

2798. Therefore, as far as regards the maintenance of the reaches for the navigation, that expense falls more heavily upon the millers, where there are any millers, than upon the Navigation Commissioners?—Probably.

2799. In the places where there are weirs in the hands of the Commissioners, but no millers, are there any old lock dues levied?—No; at the places where there are weirs in connexion with the pound locks the weirs have been constructed recently—that is to say, comparatively with the old locks upon the river.

The witness withdrew.

Adjourned till Tuesday, November 14, 1865.

Reading, Tuesday, 14th November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.
JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.
GODFREY LUSHINGTON, Esq., Secretary.

Mr. JOHN JACKSON BLANDY examined.

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Mr. J. J. Blandy.

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2800. (*Chairman.*) Reading is a town with a Municipal Corporation?—It is.

2801. And you are the town clerk?—I am.

2802. What number of councillors and aldermen are there?—There are six aldermen and 18 councillors.

2803. You have, I believe, adopted the Local Government Act?—We have.

2804. And there is a local board of health?—There is.

2805. There are both gasworks and waterworks in the town?—Yes, but they belong to private companies.

2806. Has the Thames been the source of anxiety to the corporation in any form or way?—No, I think not.

2807. I believe that the Thames is at some distance from the town?—The navigable part of the Thames is about half a mile distant from the town, not from the boundaries of the borough, but from the inhabited part of the town; a portion of it forms the boundary of the borough.

2808. Is the Thames now used as a navigable highway to the town?—With the assistance of a canal. There is a canal connecting the Thames with the Kennet.

2809. I believe that there are occasionally commissioners' meetings in Reading?—Yes, and up to a very recent period there have been.

2810. Are you yourself a commissioner?—I am.

2811. Have you attended any of the committee meetings?—No. I have never served on the committee at all.

2812. Would the existing Thames Conservancy Board be a proper form of government to which to hand over the river?—I think not.

2813. Is that your private opinion, or is it the opinion of any other parties that you are aware of?—I do not know—I have not communicated with any others upon the subject—it is my private opinion. I think that the Conservancy are a body of men too far removed from the provinces to be able to legislate for the whole river.

2814. Have you any observations to make to the Commissioners with regard to this inquiry?—No, I have none at all, except about the drainage of the town; it is extremely bad, there have been complaints for years of it.

2815. (*Mr. Harrison.*) What is done at present with the sewage of the town?—Reading is a nest of cesspools; it is more like a honeycomb than anything else. There is scarcely a part of Reading which is not saturated with cesspools.

2816. What is the subsoil of Reading?—I believe that clay is the sub-soil; there is a great deal of gravel, and also chalk.

2817. Are these cesspools made into the gravel or into the clay?—Beyond the gravel.

2818. Are the cesspools periodically cleaned out?—As occasion requires. The noses of the inhabitants will point out very distinctly when that is being done. We are assailed night after night with something of that kind.

2819. Do outlets exist from those cesspools into sewers of the town?—I have no doubt they do in many instances; in fact, there is no other way of getting rid of the matter. If a flood of rain comes the cesspool is filled and the liquid must flow somewhere. I have no doubt that a vast number of drains have been made which nobody now has any cognizance of. The greater portion of the drainage of Reading is surface drainage.

2820. (*Chairman.*) Have you borrowed anything for main sewerage?—No.

2821. What is the population of Reading?—It was about 25,000 by the last census, and I am told that is now about 27,000.

2822. Is Reading a growing district?—Certainly; an increasing one.

2823. Do you know what the last assessable rating value was in round figures?—About 100,000*l.*, in round numbers.

2824. You will ultimately have to face a complete system of sewerage?—Yes.

2825. Therefore it is of the utmost importance to you that you should be satisfied with the proposed governing body of the Thames valley?—Yes.

The witness withdrew.

Mr. EDWARD BLACKWELL examined.

Mr. E. Blackwell.

2826. (*Chairman.*) You are the mayor of Reading?—Yes.

2827. Are you aware of the condition which the navigation has fallen into?—I have every reason to believe that the navigation is almost stopped, that the river is clogged with weeds, that the locks are in a dilapidated state, and that unless something or other is done the water of the upper part of the river will soon flow out of the Thames.

2828. Is it your opinion that some form of government should be established which shall take cognizance of all the interests connected with the river?—Yes, that is quite my opinion.

2829. Do you know whether the ruinous condition of the Thames navigation is in consequence of trade having been removed by the railways?—I have no doubt that it is partly in consequence of trade diverted to the railways, and partly in consequence of the tolls on the Thames being so heavy that water carriage cannot compete.

2830. (*Mr. Harrison.*) You were in business in Reading before there was any railway?—Yes.

2831. Were you then in the habit of receiving goods by water?—Generally heavy goods.

2832. Can you state the amount which you were accustomed to pay per ton for the goods which you received by water?—As far as I can remember for the description of goods which I was in the habit of receiving—paper and stationery—I paid about 15*s.* per ton from London.

2833. What rate do you now pay for the carriage of paper by railway?—The rate is lower now by railway than it formerly was by water, but how much lower I cannot tell you, in consequence of the different classifications which are made by the railway companies.

2834. Can you tell us at all as to the rates for the carriage of coals?—A great deal of inland coal is brought from the west by way of Bristol and from Wales, and from the Midland counties, Derbyshire, and so on, but all the Newcastle coal comes here through London by different railways; a small quantity comes by the river Thames.

2835. (*Professor Way.*) I should be glad if we

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could get evidence to show whether the condition of the navigation itself was the cause of the traffic having been diverted to the railways, or whether it was that railways afford greater advantages ?—I can give you one instance which I think will bear upon the point. I am a director of the gas company here, and some two years ago we had to get large quantities of fire-bricks and other materials from Newcastle—we should have preferred having them by water, but the rate of carriage by water was nearly double that by railway—it was 9*s.* per ton as against 4*s.* 11*d.*

2836. (*Chairman.*) Do the railway companies offer any greater facilities by having their depôts and yards and stations nearer to the business of the town ?—Of the two, the wharves are rather in a more central situation than the railway depôts.

2837. (*Mr. Harrison.*) How is it in London ?—There are three railways coming to London. The Great Western Railway station is at Paddington; that is very much out of the way. The South-eastern Railway station is at London Bridge, and the South-western Railway goods station is at Nine Elms. Perhaps the one or the other would be convenient for what is required.

2838. Would you at all fear the government of the river passing into the hands of the Conservancy Board? —Personally I should not. I do not know what the feelings of others may be.

2839. (*Chairman.*) Are there any further observations which you have to make ?—We have sometimes experienced considerable difficulty in the winter in getting coals up to Reading in sufficient time. The coals have been very much wanted, and the trucks have been standing on the line, but could not get up to the station to be unloaded. The railway appears to have had more to do in that respect than it could manage, and if the river could have relieved it it would have been a very great benefit to the town. The river, however, would not help us much except with the Newcastle coal. The navigation towards the west of England—I mean the old Kennet and Avon Canal—has been bought by the Great Western Company, who therefore have it in their own hands.

2840. In the event of any competition by the river, would not the railway companies immediately bestir themselves and give more sidings and accommodation and reduce their fares ?—Perhaps they might.

2841. The navigation might serve a good purpose for a while and then become bankrupt ?—I do not hope to see things done in that way.

2842. It has been said that if the Government would supply the money for putting the Thames into a proper state, those within a certain distance might submit to a rate to pay the interest upon the money which was expended ?—The people of Reading would be very glad to have the benefit of water carriage if it could be made self-supporting, but I do not think that they would like to be rated.

The witness withdrew.

Mr. T. Rogers.

Mr. Thomas Rogers examined.

2843. (*Chairman.*) You are clerk to the local board of health ?—Yes.

2844. How long have you held that office ?—About 14 years.

2845. Are there any public sewers in Reading ?—I believe there are some very old ones. There is no regular system of sewers.

2846. Are there many cesspools ?—A great many, I believe.

2847. Are there many private wells ?—We have a very good supply of water from the company. There are wells in houses and yards—many hundreds, no doubt, but I do not think they are very much used.

2848. Does the local board of health exercise jurisdiction over the cleansing of cesspools or ash middens ?—Yes, but we do not contract for the work.

2849. Do you allow any individual proprietor to form his cesspool or his ash midden, and store his refuse as long as he likes, and remove it when he likes ?—No; he makes his own cesspool and his own ash midden, and has it emptied, but all under the restriction by the bye laws made under the Public Health Act. He would not be allowed to occasion a nuisance to anyone.

2850. Have you an inspector of nuisances ?—Yes.

2851. Have you a medical officer of health ?—No.

2852. Are there any nuisances caused by the emptying of those privies and cesspools ?—Yes, very great.

2853. As you do not contract for the emptying of the cesspools, you do not know anything as to the cost to the public ?—No, it would be a very large cost no doubt.

2854. Are the inhabitants able to sell the refuse to farmers at any special time of the year ?—Not as a rule. I believe certain persons in the town have mixed night soil with ashes and sold it in that form, but to a limited extent.

2855. Have you had any plans for complete system of sewerage before you at any time ?—Yes, several. The first general scheme was prepared by a local architect, Mr. John Billing, the author of the report presented to the corporation in 1846; there was an inquiry in 1846 upon that scheme which lasted three weeks and cost between 6,000*l.* and 10,000*l.* The scheme was a very large one, not simply a sewage scheme, but it comprised markets and waterworks. I believe the estimate was 150,000*l.* or 200,000*l.* The town was very much opposed to it, and that inquiry has left a very sore feeling against all schemes of a similar kind, of which two or three have since been proposed.

2856. You had a scheme by Mr. Marshall, your local surveyor ?—Yes.

2857. What was his estimate ?—I will hand you his report. That scheme was also nipped in the bud.

2858. Has there been any fresh scheme brought forward since ?—No.

2859. You have rested contented since then ?—Yes, the original fear was no doubt the great expenditure; but a better feeling has prevailed in the town within the last six or eight years. My own opinion is that if the town could have been satisfied upon the question of the outfall a good scheme might have been carried out, and I think it would now. I should say that during the last four or five years we have done a great deal of good in different parts of the town in the way of surface drainage. The surface drains would, if there were also an underground system of sewers, still be very largely applicable. We have spent several thousand pounds that way.

2860. Do you know what 6*d.* in the pound would bring you upon your rateable value.

(*Mr. Butler.*) The gross rateable value of the town comprised in the three parishes is 107,760*l.*, and the rateable value might be 86,000*l.*

2861. What is your population ?—By the last census it was 26,700.

2862. A 6*d.* rate at the lowest valuation would bring you upwards of 2,000*l.* a year, that would represent a capital of above 40,000*l.* at 5 per cent. ?—Yes.

2863. Would your board be surprised to be told that for 25,000*l.* or 26,000*l.* they might have a complete system of sewerage with an efficient outfall ?—Some members of the board would not be surprised. I believe the expense has been very much exaggerated.

2864. Have you had much cholera at any time in Reading ?—No.

2865. Have you much typhus or other fever ?—I do not think Reading suffers from fevers to the extent that towns of a similar size do.

2866. Have any complaints been brought before

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the local board with regard to nuisances arising from gasworks or tanyards ?—Yes, very frequently.

2867. Have there been any complaints made against you for causing nuisances by allowing existing drains to discharge refuse into any watercourses or streams in the suburbs ?—No, I do not remember any such complaint ever having been presented to the Board; there have been complaints made against individuals for discharging their sewage into our sewers. I believe that goes on to some extent, a great deal of the sewage of the town is conveyed by the sewer into the river.

2868. Have you heard of any complaints with regard to noxious trades ?—Yes, tanyards for instance; but we have not many noxious trades in the town. We have got rid of private slaughter-houses. We have built public slaughter-houses.

2869. Do you know the condition of the Thames at all ?—I know nothing except what one sees. I ride over it every day.

2870. Are you a commissioner ?—I believe I am.

2871. By qualification ?—Yes, I qualified 14 or 15 years ago, but I have never attended any of their meetings except one general meeting.

2872. Have you ever received any summons ?—No.

2873. (*Mr. Harrison.*) Is the sewage matter from water closets or privies allowed to be carried into the public sewers in Reading ?—Not legally,

2874. Does the local board of health take any steps to prevent its being carried in ?—If a person comes to us and makes an application to drain into the river we refuse it; but we do not take upon ourselves to interfere with the rights of persons who have done so for many years; only if any new drains are proposed to be made to carry off sewage matter into the streams of the borough we do stop them.

2875. There is a quantity of sewage which passes by the railway station into a branch of the Thames, where does that sewage come from ?—From the railway itself; there is a large drain there, and a great nuisance it is.

2876. There is a sewer that comes into the Kennet, and discharges a considerable amount of sewage, is there not ?—You may see drains all over the town draining into the Kennet. Nearly every house on one side of Castle Street drains into a tributary to the Kennet.

2877. What is the state of the river Kennet as it passes through the town of Reading ?—Not satisfactory, I should think.

2878. What steps have the local board of health taken to remove the nuisance ?—We have given notice to the gas company over and over again. The chairman of the gas company tells me that they do not commit a nuisance at present. We have had no complaints this last year or two.

(*Mr. Taylor, Chairman of the Gas Company.*) At the present time no refuse from the gasworks is poured into the stream, neither has there been for some time past, because it is too valuable to throw away.

2879. We were informed by a former witness that the supply of water to the town is taken from the Kennet above Reading. Do you know of any nuisance being poured into the Kennet ?—We had a complaint only a few weeks since of a nuisance alleged to be caused about five miles above the town by the Sheffield paper-mills, and we had a correspondence with the proprietor of that mill.

2880. What was the result ?—After having had the water analyzed we found it not to have been contaminated. With respect to that I should like to draw your attention to a great defect in the Public Health Act. When I tried to see what powers we had to prevent the fouling of the stream I found that under the Public Health Act, there was no power vested in the board of health to prevent the general pollution of streams within its jurisdiction, unless such pollution amounted to an absolute nuisance, and I was obliged to put in action the Reading Waterworks Company, who, under the Waterworks Clauses Act, have the power to prevent any pollution of the stream, which is the source of this water supply.

2881. In endeavouring to improve the condition of the Kennet, what have you done as a local board ?—Whatever we have done has been done under the Public Health Act. We have cleansed one or two of the cuts. We have taken the filth out of the tributary called Holy Brook, into which a vast number of closets drain from the higher part of the town. We have cleared it once or twice; last year we spent 80*l.* or 90*l.* in taking out filth from a portion of it. It used to be a regular, good stream of water, but so much filth had accumulated from closets and such like that in fact it had ceased to be a stream. There had ceased to be any flow of water at all.

2882. Any person boating on the Thames below Reading would meet with a number of dead dogs and such like. Does the local board take any steps to prevent their being put into the river or to take them out of the river ?—I do not think we should have jurisdiction over the Thames.

(*Mr. Butler.*) We employed some men to see to them last summer, but not many were found.

(*Mr. Rogers.*) I have seen three or four at times but very few, I do not think we have jurisdiction over the Thames if we did see them. I think it is a great defect in the Public Health Act that we have not.

2883. You consider that you have jurisdiction over the Kennet, inasmuch as you have removed filth from it ?—We might have done that because it was a nuisance.

2884. (*Professor Way.*) I understood you to say that there was a general accord of opinion in the town to have a good system of sewage if a proper outfall could be obtained ?—Always assuming it can be done within a reasonable expense. There are in the town a great many owners of small tenements, and my opinion is, if any scheme were proposed which involved a large expenditure they would unite and oppose.

2885. You say the difficulty lies in the question of the outfall ?—Yes.

2886. The assumption being that the outfall must be into the river ?—Yes, the question is what to do with the sewage.

2887. Suppose an artificial outfall, if we may so call it, were found in the application of the sewage to land, would the difficulty be got over ?—That would depend entirely on how far you could carry conviction to the public mind of the plan being feasible. The scheme of 1846 involved distribution of the sewage, but it was that which made the great obstacle to that bill. People did not believe in the practicability of the proposal, the river having been hitherto looked to as the natural outfall, and it being supposed that in course of time putting sewage into the river would be prohibited. At this present moment the fatal impediment to our discussing a system of sewerage is not knowing what our outfall would be, and not knowing whether we could drain into the river or not.

2888. You spoke of complaints having been made of gas works or tanyards, was that with respect to their effect on the water supply or on the river ?—On the river. The water supply is taken four or five miles above the town, so that the water supply is not affected except at the lower end of the town where the inhabitants take water out of the river Kennet. The poorer class of people on the Kennet, who take water from it for domestic purposes, have complained of its being polluted.

2889. Is the water supply from the company generally satisfactory in quality ?—The present supply is unobjectionable I think.

2890. Would not such a stream as that running by the railway, which is a stream running into the Thames and not forming part of the Thames navigation, come under the jurisdiction of your local board ?—The distinction I draw is this; I do not think we have any power, enabling us directly to deal with the person who polluted that water, so as to render it unfit for

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domestic use, but if it were so dealt with as to become a nuisance, then we could deal with it as a nuisance, and not because the water was polluted.

2891. Is not the stream near the railway station now a nuisance?—We do not call that a stream, it is a ditch; the water in it is not used for domestic purposes, we have ample power for cleansing ditches and so on.

2892. Did I rightly understand you to say that the water of the Kennet is used by the inhabitants on its banks for domestic purposes?—It is used, and they have complained of its being corrupted; I believe I am right in saying that some time ago when there was rather a bad fever in the town, the district by the river was seriously visited.

2893. If the water of the Kennet is used by some of the inhabitants for domestic purposes, does not the person who pollutes it cause a nuisance?—The water might be rendered unfit for domestic use, and yet there might be no case of nuisance, such as we could deal with.

2894. You mean that so far as your power of interference goes, the water may be ever so impure so long as it does not offend the noses of persons living in the neighbourhood?—Yes.

(*Mr. Butler.*) There is no necessity for persons living on the banks of the Kennet to use the river water for domestic purposes, they could for a small payment have the water of the company.

2895. (*Chairman.*) Would your ratepayers be surprised to learn that the carrying out of proper drainage works, instead of depreciating the value of property in a town, has the effect of very largely increasing it?—Some of the more intelligent people in the town are probably aware of that fact, but the bulk of the inhabitants would require great proof of it.

2896. (*Mr. Harrison.*) What is the death rate in Reading?—(*Mr. Taylor.*) 20 to 21.

(*Mr. Rogers.*) One peculiarity in Reading is that it covers a large area of ground in proportion to the population.

(*Mr. Carter, surveyor to local board.*) There are 32 miles of road.

The witness withdrew.

Mr. C. Stephens.

Mr. Charles Stephens examined.

2897. (*Chairman.*) You are chairman of the Water Company?—Yes.

2898. Where do you get your supply?—From the Kennet about two miles above Reading.

2899. Have you filter beds?—Yes, close to Reading. The water is pumped from the source across the country (instead of pursuing the course of the river), into reservoirs at the Bath Road at the western part of the town, and from thence drawn through the filters.

2900. What volume do you pump per day?—According to the requirements of the town.

2901. What is your engine power?—We have not a steam engine, except for the high service; we have two water wheels and two sets of pumps.

2902. Of what diameter?—Twelve inches and three feet stroke, working 10 strokes a minute.

2903. How many pumps have you?—Six, three to each water wheel.

2904. Do they all work at once?—They all work at once; but if the reservoirs are full they are stopped, or one set only is worked at a time, and they are set on again afterwards as required. By the return of the engineer whom we employ, it appears that one set of three pumps working 10 strokes a minute produces 21,000 and a fraction gallons an hour, and the pumps work day and night.

2905. What is your lift?—I have been told that it is 95 feet into the reservoir; the main is a 12-inch main.

2906. Does the company exist under Parliamentary powers?—Yes, under a special Act, and besides that we are under the General Waterworks Act.

2907. What is the date of your Act?—1851.

2908. What is your annual income?—Our income is increasing gradually. For the half-year ending September 1864, it was 2553*l.*

2909. Do you supply the railway companies?—Yes, both.

2910. By meter?—By meter.

2911. At how much a thousand gallons?—I do not wish to say, but I can tell the quantity we supply the Great Western, we supply them between 600,000 and 700,000 gallons a week; nearly 100,000 gallons a day; we do not supply them with the filtered water, but we have works which pump from a separate supply solely for the railways, and for watering the streets.

2912. Have you had any cause to complain of the fouling of the water above you by manufactories, or sewage, or anything else?—We have had no complaint made to us of the water we supply, but we have been informed and we know, that there are deleterious matters put into the water about three miles above our works, by the Kennet Paper Company.

2913. Have their works been recently established?—The works have not been recently established, but I believe they have been enlarged.

2914. Have you, as chairman of the water company, taken any action to prevent their polluting the river?—We have had a correspondence with them in consequence of having been called upon by the Local Board of Health, that Board finding itself unable, under the powers of the Public Health Act, to deal with the matter. We investigated it and saw what went into the water, and under the directions of the Local Board of Health I believe an analysis was made of the water after it had passed through our filter, and the water was not found to be at all injured. We had an interview a short time since with the two gentlemen who represent the paper making concern, and they said they were about to throw this matter (which now goes into the water uninterruptedly) upon certain beds of gravel which they meant to construct in order, if possible, to separate the injurious properties from it. They said they would undertake to do that shortly, whether they have or not we do not know.

2915. What is your delivery per week to the town?—(*Mr. Monk*) On one occasion the engineer measured one day's consumption, it was before they began watering the streets, and on that day 300,000 gallons were used for domestic purposes only.

2916. (*To Mr. Stephens.*) Is it an intermittent supply?—No, a constant supply; the pipes are always full.

2917. In case of fire could you put on the hose and get a supply at once from the mains?—Yes; from standards and hydrants lately supplied.

2918. What height could the water rise?—There is 60 to 70 feet pressure in this part of the town. I have seen them at the biscuit factory throwing over the whole of the buildings.

2919. Have you ever any scarcity at your source?—No; never.

2920. If the town increased in size, and if a system of sewerage was carried out, so that an additional supply of water was required, would you be prepared to give it?—Yes, we could give a supply to any amount that could be required. We have the whole of the Kennet, with a fall of 6 feet; there is a corn mill upon it belonging to ourselves which could be made available.

2921. You could convert that mill into pumping power if you liked?—Yes.

2922. You consider that you would be able to give a full supply to the whole of the borough whenever it is required?—We see no difficulty in doing so.

2923. Do you charge upon the rental?—Upon the gross rental; we charge the lowest houses only 1*d.* a week. I will hand in the published scale of charges.

2924. What dividend do you pay?—We have never

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divided more than five per cent., and it is only lately that we have arrived at that.

2925. What do you charge for waterclosets ?—8*s.* for a single one, and 4*s.* for every additional one ; the charge is lower for smaller houses.

2926. What is the capital of the company ?—42,000*l.* share capital, and 14,000*l.* borrowed, 56,000*l.* altogether. Originally the works were very old works, and in the middle of the town, and a considerable expenditure was gone to in constructing larger reservoirs on the south-west part of the town. We obtained another Act for the purpose. As regards our capital and our expenditure, our waterwheels are not a constant expense as a steam-engine would be, inasmuch as they require no feeding. I suppose a steam-engine could not pump what those wheels pump under 1,000*l.* a year.

2927. Are you a commissioner of the river ?—Yes.

2928. Have you served upon any of the committees or sub-committees ?—Never.

2929. Do you know what condition the navigation of the Thames is in ?—By common report it is very bad, and the locks and bridges require a great deal of reparation.

2930. Have you formed any opinion whether it would be worth while so to improve the river as to make it an efficient navigation ?—It is believed by many that if it were restored to its proper condition it would act at all events as a rival to the Great Western, which has almost destroyed it.

2931. What is your opinion of the present constitution of the commission ?—It is encumbered by an immense number of commissioners who never act, but the working committees have done and are capable of doing great service, because they have local knowledge of different parts of the Thames.

2932. Supposing the Thames to be put into proper condition, do you think that the property on its banks, which would be improved, might pay for the improvement ?—I cannot say I see my way to that being done. Of course it must be remembered that the railway has become the great rival of the navigation, and has carried off its traffic, and will continue to do so to a very large extent.

2933. It has been said that as the case of the Thames is exceptional, Government should take upon itself to give as a bonus to the bondholders of the Thames the value of their bond, and then should begin afresh, do you think that that proposal could be maintained for a moment ?—As bondholders, we should have no objection to seeing such a proposal carried out, but whether the Government could be prevailed upon to do so is another question.

2934. If the Government could be prevailed upon to do so, do not you think they would have thousands of applications from all parts of the empire for money out of the public purse for similar purposes ?—No, I do not see that. It is a large national object to keep up the Thames ; the Thames is the great drain of a large district, and a most valuable stream in many respects as regards the mills and works on it, the fishing in it, and the irrigation of the lands on its banks, and the Government I think would be justified in upholding it. I think the Government might well be called upon to do something.

2935. If the Government were to be called upon to part with its money either to pay the bonded debt or to establish any works, would it not be perfectly justified in setting up a government commission to look after the navigation ?—No doubt they would wish to control any works that were made.

2936. Would not that be open to the objection that that you would be setting up a centralized authority to supersede private authority ?—The control might be one of inspection only.

2937. (*Mr. Harrison.*) Seeing that a considerable sum of money has been borrowed for executing certain works upon the river and seeing that the commission under which those works were executed, has come to a stand-still, and that the bondholders are in a fair way to lose all their money, do you think there would be any probability of raising money upon the Thames itself and upon the tolls to be levied ?—No, I do not see that there would. I think the only way to manage the river is to increase the traffic.

2938. (*Chairman.*) Do you as a Water Company pay anyone for the right of taking your water ?—No, we purchased all the rights we possess of the Kennet Navigation Company. We also pay 8*l.* per annum to St. Giles' mill in the town for the right to use a small water wheel for supplying railway and street water only.

2939. (*Mr. Harrison.*) Are you a bondholder of the Thames ?—Yes. The bonds were considered very good securities 30 years ago, they paid 5 per cent., and it was always considered a desirable thing to hold them.

2940. In the case of a railway company, Parliament provides that the speculators shall raise among themselves a certain sum of money, and shall expend a certain proportion of that in the execution of their works before they borrow any money, in that case the bondholders have something to fall back upon ; but in the case of the bondholders of the Thames there does not appear to have been any such prior expenditure, their money is the money that is speculated with, and they are limited to a maximum dividend of 5 per cent. Does not there appear to you to be something radically wrong in a system of raising money upon such terms ?—It was an error committed many years ago, it is not the way money is now raised.

2941. (*Chairman.*) Would there be any difficulty in buying up the existing bonds at something like the market value ?

(*Mr. Butler.*) Before the committee of the House of Commons I stated that the bond debt being 84,000*l.* I thought the bondholders would take 2*s.* in the pound, or 10*l.* per bond, which would require 8000*l.* I was asked what the bondholders would be giving up in return for that, and I said property of equal amount in my opinion. I believe the property is worth 8000*l.* to 10,000*l.* The bondholders in this part of the country agreed to take that amount. I was authorized to state that.

2942. (*Professor Way.*) Would they be inclined to take that amount if any general measure were being entertained for the restoration of the Thames ?

(*Mr. Butler.*) A few years ago when the bonds were paying 4 per cent. they sold at 50 guineas each.

2943. (*Mr. Harrison.*) Do you think it at all probable that money for restoring the navigation can be raised now without some collateral security besides the tolls ?—I do not see how any collateral security for the payment of the interest is to be provided, unless some plans can be devised for increasing the traffic.

2944. (*Professor Way.*) We have been told that if the river were in a good condition at this moment the traffic could not be carried on remuneratively as against the railway. Is that your opinion ?—That is said, but there is a certain amount of traffic carried on.

2945. The impression at Oxford seemed to be that it was not desirable to make the upper part of the river navigable. Do you think the same view is held at Reading ?—No, I do not think so.

(*Mr. Pring.*) Even at the present high rates of toll, which ought to be altered, many people would be still willing to have timber by water if it were not for the uncertainty of getting it through the locks in consequence of their bad state.

(*Mr. Butler.*) Water carriage is more suitable for the carriage of timber than the railway. It is highly dangerous to carry a large amount of timber on the railway.

2946. (*Professor Way.*) Do you consider that the present Board of Commissioners represents the navigation and the proprietors of land, and so on ?—As it is now constituted I think it might with effect exercise the power of electing an executive body.

2947. Do you think there is any interest not represented in the Board of Commissioners ?—I should think not.

2948. (*Chairman.*) Do you think the present body

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would be for elective purposes—so good a body as the county magistrates, for instance?—I do not think the present body so good a one for elective purposes as a more confined and select body. If the number were less there would be a better attendance. I do not say that I would put the election into the hands of the county magistrates.

2949. If all the magistrates of the counties affected by the Thames were to form the constituent body, would they not be as large a body as the present commission?—Not so large as the present commission. A great many magistrates have no interest in, and no knowledge of the Thames, comparatively speaking?

2950. You are a banker, I believe?—Yes.

2951. Do you think the Government would be willing to advance 100,000*l.* in instalments at a low rate of interest, repayable, say, in 30 years, provided there was a properly constituted Board representing the interests of the whole of the Thames and the money was expended exclusively upon the work necessary to put the Thames in order and maintain it, and that Government had the power to veto improper works?—The question is, who is to be answerable for the principal and interest. No money would be advanced by banks or private individuals for such a purpose—certainly not at the rate at which Government would advance it; but still the Government, if it did lend the money, would not lend it without adequate security. The tolls may not be adequate.

2952. (*Mr. Harrison.*) You think any rate would be objected to?—I should think so. No one has dreamed of a rate on property adjoining the Thames. The parties who have really the greatest interest I take to be the millowners. If the locks, from the pressure of the water and their more decayed state, become destroyed, the miller would lose his head and have to go to the expense of damming up the water, and thereby he would cause an obstruction to the navigation.

The witness withdrew.

Adjourned to to-morrow at 10 o'clock.

Reading, Wednesday, 15th November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY,

GODFREY LUSHINGTON, Esq., Secretary.

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Mr. WILLIAM EXALL (of Reading) examined.

2953. (*Chairman.*) Do you reside near Reading?—In Reading.

2954. Are you engaged in any business connected with the Thames?—I was one of those who established the iron works here some 30 years ago which are continued now. We used to have a great deal of material up the Thames, and to send a good deal down the Thames.

2955. Did the traffic go from the Thames in consequence of the railways carrying at a lower rate, or because they offered greater facilities?—The two things combined.

2956. What are the lock tolls upon the Thames?—The river tolls upon coals from London to Reading, are equal to the whole expense of carriage by railway.

2957. (*Mr. Harrison.*) What is the expense of hauling coals?—I heard from the chairman of the gasworks that the haulage would be something like 4*s.* 6*d.* He told me that the gasworks require something like 6,000 or 7,000 tons of coal in the year. They would like to have it from London if they could get it cheap by water, for it would then be brought directly to their wharf, but the railway can bring it cheaper.

2958. It was stated yesterday that the railway charges was 4*s.* 11*d.*?—Yes, or 5*s.*

2959. What does hauling by steamboat cost?—I planned out a steam-barge some years ago just in order to try and to see how far the river navigation might be resumed.

2960. What is the tonnage of your steam-barge?—Fifty tons.

2961. What horse-power is it?—Nominally, 10 horse-power.

2962. Can you state the entire expense of it, all fitted up?—Something like 750*l.*, including the entire steam apparatus of an iron barge.

2963. How long does it take you to make the voyage to London?—If there were no stoppages we could do it in a day, by starting early in the morning we should be there in the evening.

2964. In summer time when there are stoppages, how long does it take you to get to London?—That is quite uncertain. I went down on a trip not long ago—we took in a quantity of flour at the mills at Sonning, I should think about three-quarters of a load, and before we got down to Maidenhead we grounded several times, and we were constantly grubbing over shallow places owing to the millers drawing down the water so low, and we were obliged to come back by railway.

2965. How long was the boat detained?—All night.

2966. And when the millers commenced to let out the water in the morning I suppose the boat floated off again?—Yes.

2967. If you could make the voyage to London and back in two days (as you say you can when there are no interruptions) at what cost per ton could you then convey the goods of different descriptions—coals, for instance?—If the tolls were about one-third of what they are, and the river was clear, I think there would be just a wholesome competition with the railways.

2968. The river itself would require to be taken in hand and to be repaired very considerably?—Yes, thoroughly. Undoubtedly the locks must be entirely renewed. There must be some dredging at particular points. I should mention that we were only drawing three feet of water when we grounded, and that is not bearable for a navigation.

2969. And that was also with only three parts of a load?—Yes.

2970. How many feet of water do you draw with a full load?—3 feet 10 inches.

2971. Is that the limit the Commissioners allow?—No, 4 feet, allowing for contingencies; I built the boat to carry 50 tons with that draught of water.

2972. Have you found any difficulty from the height of the sills of the locks?—The complaints made by the captain of the barge are constant, about being hung upon the sills of locks, and other hindrances.

2973. Some of the locks then require to be lowered?—Either the locks must be lowered, or the head of water below must not be dropped down so low; the reason why the barges rest upon the sills is because the millers draw the water down so much at the mills below; in fact there is not that surveillance exercised over the existing works that there ought to be.

2974. In what part of the ponds do you generally

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find these shallows?—Generally just below the lock, and for this reason, that mills are situated generally near locks; mostly there is a great sluice of water, which throws up the gravel and soil, and in that way makes the river shallow.

2975. Have the Commissioners taken any steps to remove those obstructions to the navigation?—I do not think they have, indeed I pretty well know that they have not the means of doing so at present.

2976. Have they done so in former years?—Not since I have had to do with the actual working of the Thames; all that I have known would be merely a repairing of lock gates, to keep them from giving way; there seems to be no more done than absolutely necessary repairs.

2977. You say that millers use the water apparently as they like?—They take liberties with it, and draw it down lower than is good for the navigation, and I believe lower than is good for their own benefit; there is Mr. Witherington down below, one of the best millers on the Thames, and the bargemen say that he keeps the best head of water of any miller, he knows that keeping a good head is more economical than reducing the water down so low.

2978. What is the tonnage that might be expected between Reading and London, if the navigation were restored?—In fair times I should say that the steam boat just about keeps moving; I think there is no profit, it just maintains itself at present.

2979. The Thames in this neighbourhood, both above and below Reading, is very beautiful?—Quite so.

2980. If the Thames were put into a thoroughly good condition, is there any probability of small steamers navigating it to carry passengers?—The project might be worked along with the carrying of merchandize, but I do not think it would do independently.

2981. Have you frequent floods upon the grass fields below Reading?—Occasionally; once in a few years the meadow out here is flooded.

2982. Not more often than that?—No.

2983. For how many days does a flood continue, when you have one?—About a week generally, sometimes more.

2984. It has been stated in evidence that if lands were flooded not more than four or five days they would be benefited by it?—Yes; the sediment I have no doubt is very beneficial to meadows, if the flood is on only for a few days; but it has been on longer than that, and it has been frozen over.

2985. Do you know the meadows up the Kennet?—Yes.

2986. Are they much subject to flooding?—They were years ago.

2987. In Mr. Billing's report to the committee of the Town Council of Reading in 1846, he states that cesspools in Reading extend through about 19/20ths of the borough?—The cesspools abound to a very great extent, to a much greater extent than they ought to do.

2988. Mr. Billing gives a wretched account of the state of the cesspools at that time, and of the effect of emptying them?—The emptying is constantly being done, every night, and is a great nuisance to the inhabitants.

2989. The cesspools still continue as great a nuisance as they were 20 years ago?—Yes, except that they are better emptied; but (whether or not it is in consequence of the increase of population I do not know) they are emptied oftener than they used to be I think.

2990. You are constantly upon the Kennet and must know its condition very well; is it in an offensive state in summer time?—Through the town it is very much so.

2991. The water in it is very stagnant, is it not?—Yes; during dry weather it is about as offensive as you can fancy a body of water could be; it is hardly a stream in the summer time.

2992. (*Chairman.*) What velocity can you get out of your steam barge?—Eight miles an hour when there is plenty of water; not through the canal.

2993. The moment you get into the canal you lose 2 or 3 miles of velocity with steam power?—Yes; we are obliged to keep a great wave a-head, and then there is a rush by; the friction is more than you would suppose.

2994. Does your barge carry anything behind her?—Not professedly; but when in deep water where the Thames is wider, and there is plenty of room, I have understood that my captain has had as many as eight or nine behind him, he hitches them on.

2995. What length is the boat?—Seventy feet.

2996. What length would the locks admit?—Seventy feet above Reading and more than 100 towards London. The boat was made bluff to carry 50 tons to get through the locks above Reading to go to Bristol; but from here to London we could put on a barge to carry 100 tons of a better shape and better appointed.

2997. The locks would admit them?—Yes, the locks are larger between Reading and London.

2998. Would there be a danger, if these barges were more common, of interfering with the banks of the river?—No one has complained, and I do not think that any complaint would be made, generally speaking I find that the steam-barge does a great deal of good, it drives the water into the gully-holes, and brings it out again. In the Thames proper I have not heard a word of complaint.

2999. Have you seen any double-screw vessels?—Not for canal work; this barge has a double paddle kept within boards—the pressure is at each bow—then it is parallel, and then it comes tadpole fashion—the wheels are on each side of the narrow part of the boat—the boat has a full loading space in the middle, and the paddles do not extend more than 12 feet 6 inches from side to side.

3000. With double screws turning opposite ways, the effect is to injure the canal very little?—I believe that that is a very good plan; but where you are occasionally reduced to three feet in depth, you could not do much with a screw. Wheels seem preferable in going into a lock; if we go in ever so fast we can by reversion pull the boat back directly, she is perfectly manageable. She is 13 or 14 feet wide, and could be easily made to carry 100 tons and work well through the river.

3001. (*Professor Way.*) On the Kennet I believe there are some paper mills?—Yes.

3002. The Kennet river passes your house?—Yes, part of it—the river divides into two—one is called the Kennet proper, and the other Holy brook, which runs out from the main stream, and joins it again a quarter of a mile below this.

3003. Do you suffer inconvenience from any discharge from those paper mills into the river?—It makes no difference to me. I do not use the water; the water is only ornamental. The liquid refuse kills the fish, and I see sometimes fine fish turned up with it in Holy brook. In the morning I find there has been a flood, and matter comes down that does not look very nice in the day; but I find nothing disagreeable.

3004. What do you attribute that to in the morning?—I think that the men who are scolded for throwing this nuisance in get rid of it in the night, and it runs down without being observed.

3005. Is there no frothy appearance?—Not often, but occasionally.

3006. No discolouration of the water?—There is a little yellowish tinge, but nothing very particular—Colonel Blagrave was the first who took any notice of it.

3007. (*Mr. Harrison.*) Have you considered what steps should be taken to put the Thames into proper condition?—Most of us have thought over that matter. I think that in the first place the water of the Thames should be locked in order to be kept pure and limpid; in the next place that the navigation should be thoroughly attended to; thirdly that the river should be made as ornamental as circumstances will allow, and not be left covered with weeds. It strikes me that the proprietors of the banks of the Thames ought to pay a portion of the expense, and that the navigation ought

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to pay another, people who use the water should also be made to contribute. I mean the actual consumers of the water. I suppose the Commissioners are aware that there are times when the whole of the Thames water is absorbed for drinking purposes. I am told that there are times when the whole of it is absorbed at Teddington, and there is nothing flowing over the weir there.

3008. (*Chairman.*) Do you know when that occurred?—It happened a year or two ago, I believe, and this year also, as I have been given to understand. The West London and the other waterworks nearly take all the water in that way from the river; they take about 40 millions of gallons a day; they receive 25*l.* for every million gallons, and I think they ought to pay 5*s.* for every million gallons. That would give a revenue of something like 2,500*l.* a year, and I do not think they would grumble to pay that.

3009. Are you aware how powerful these water companies are in Parliament?—Yes, but their own common sense would lead them to give up the matter at once, and pay the trifling sum that would be asked of them. You are endeavouring now to cleanse the river Thames and keep a good supply of water; if you do that the money you ask from them would be a very little return for the benefit they would obtain.

3010. Would the towns that benefited by the navigation be willing to contribute?—I do not think they would hesitate when they came to understand that the competition in coal alone would pay them much more than you would ask as a tax. I believe that Reading requires 40,000 or 50,000 tons of coal in a year, and if we could ensure a reduction of 1*s.* a ton upon the coal, that would amount to more than you would ask from the town by way of a tax. The consumption at my house is something like 15 tons in a year, and according to my calculation I should have to pay about 5*s.* in the shape of a tax. I should vote for maintaining the Thames; it would not cost me more than 5*s.* a year, and I should save 15*s.* I think that a tax of from a farthing to a halfpenny in the pound all down for a mile or two on each side of the Thames would not meet with much opposition if the Thames could be put into a good condition, the banks being looked after and a proper surveillance exercised. There is about 100,000*l.* wanted to be laid out upon the two banks of the river and the locks from Oxford down to Teddington, and it would yield a good return. I consider that the banks ought to pay one-third, the navigation one-third, and the waterworks one-third.

3011. What do you mean by the navigation?—I mean that the navigation should be so regulated as to induce a paying traffic. The tolls should be taken down to about a third of what they are now, and then the navigation would be resumed again, though the revenue would not be so certain as from the other two sources, the banks and the water companies. But from these three sources there would be sufficient to reimburse the Government for the 100,000*l.* that you want to lay out upon the river, and to maintain the river for the future.

3012. (*Mr. Harrison.*) Would the coal be brought from above Oxford as well as from London?—If the improvement of the Thames were carried out from here to Oxford I have no doubt that it would be put into boats and brought here, at any rate in the windings of the Thames a considerable quantity of coals would be consumed.

The witness withdrew.

Mr. Alderman Palmer.

Mr. Alderman PALMER (of Reading) examined.

3013. (*Chairman.*) You have heard the evidence that has been given as to the navigation of the Thames and the traffic, and supply of coals. Have you any observations to make on those points?—As to the coal traffic, the firm to which I belong has used more coal from the Coventry district than any one else in the neighbourhood. The water carriage was convenient to us for two reasons. One that the boats came close up to our premises, and unloaded there without any intermediate carriage, and the other that the coal came in better condition.

3014. (*Professor Way.*) The value of the coal brought by the boat is greater by more than 1*s.* a ton, and you have the advantage of getting it brought in better condition?—Yes. Notwithstanding that, the proprietors of the pit from which we get our supply of coal have brought tramways from the London and North Western Railway to their pits, and from some cause or other which I cannot easily explain prefer to send the coal to Reading by railway. We have given up the water carriage and take the coal by railway. But we should prefer the navigation, even if the water rate were a little higher than the railway rate.

3015. (*Chairman.*) What does your consumption of coal amount to per annum?—Perhaps over 1500 tons.

3016. Have you much traffic between London and Reading?—Yes, by railway.

3017. Is that a traffic which, if the navigation were put in good condition and a moderate speed ensured, you would prefer?—I think I should. Water carriage, under any circumstances, would have an uncertainty about it as compared with the railway.

3018. (*Mr. Harrison.*) Do you carry on a considerable export trade?—Yes.

3019. Could you not send your manufactures by water down to the ships' side?—In some cases we could, but in many cases time would compel us to send by railway, even at greater cost.

3020. If the navigation were put into a proper condition, Mr. Exall has informed us that his steam barge could go to London in a day. Would that meet your wants?—Our goods leave our place in the evening, and often require to be delivered early the next morning, in which case the navigation, however competent, would not meet the case. In many instances, however, it would do very well.

3021. For your export trade you would probably have a large load to carry down?—Sometimes; but there would not be sufficient regularity to make it worth while.

3022. (*Professor Way.*) Do your goods suffer at all from transit by railway?—Very much indeed; and if time was not a point we should prefer water carriage.

3023. (*Mr. Harrison.*) Time would be of importance to the extent of the difference between 12 and 24 hours?—Yes.

3024. (*Professor Way.*) What water do you use?—Water from the waterworks. The Kennet water is too full of gas discharge and all sorts of things for our purpose.

3025. (*Chairman.*) Where does your sewage find its way to?—Into the Kennet.

3026. (*Mr. Harrison.*) From how many men, women, and children?—About 800.

3027. Are your works upon the mill stream, or upon the navigation?—Our premises are really upon both streams, but our main manufactory is on the mill stream.

3028. Where there is more of the current than on the navigation?—Yes.

3029. It is chiefly on the navigation, is it not, where the population of the lower part of Reading use the Kennet water?—Yes; but our works do not affect that population at all.

3030. Your sewage goes over the river to a district where there are but few houses?—Yes.

3031. (*Chairman.*) You use the water as it comes from the waterworks?—Yes.

3032. Do you not filter it?—It does not require it,

The witness withdrew.

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Mr. J. O. Taylor.

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Mr. John Okey Taylor (of Reading) examined.

3033. (*Chairman.*) You are manager of the Reading Gas Company?—I am chairman of the Board of Directors.

3034. Was the company established by Act of Parliament?—It was.

3035. What number of retorts have you?—112.

3036. What is your annual make of gas?—Our annual make is from 55,000,000 to 60,000,000 of cubic feet.

3037. What rate do you charge?—We have a scale of charges varying from 4*s.* 3*d.* to 5*s.* The public lights are charged somewhat lower than that, 3*s.* 7*d.* per 1,000 cubic feet; the average of the whole is about 4*s.* 4*d.*

3038. What weight of coals do you use per annum; do you use cannel coal for gas making?—No; we use Ruabon, Staveley, and Parkfield coals; the latter from a colliery near Bristol—we consume from 6,500 to 7,000 tons of coals.

3039. How are they brought to you?—By railway.

3040. Would it be practicable to bring any of them by water?—Possibly, if the expense was lessened in some way. Newcastle coals might be brought by water and used advantageously; but at present the cost is so great and the carriage from the railway station to the works is so considerable, that we buy inland coals at a great advantage.

3041. Would Newcastle coals offer any advantage to you in gas making if you could get them?—Newcastle coal would make an equally good gas, and a somewhat better coke, but the cost at the present time is some 2*s.* 6*d.* or 3*s.* a ton too high.

3042. Cannel coal would offer you that advantage if you could get it at anything like the same price as inland coal?—Yes.

3043. Do you find a ready sale for all your coke?—Yes.

3044. Do you also find a ready sale for all the waste products of gas making?—Yes. We have entered into an arrangement at so much per ton with a person near Staines to take away the whole of the liquor and tar, he sends for it from the works. At the works it is stored in tanks, and it is pumped from those tanks into barrels, and removed by the contractor.

3045. Do you purify by the wet or dry process?—By the dry.

3046. What weight of lime do you use per annum? That varies very much indeed, we used lime almost exclusively up to 12 months ago. Recently we have been using oxide of iron to a large extent.

3047. That you can use over and over again?—Yes.

3048. Have you any difficulty in selling the spent lime?—We experience a slight difficulty, but we can get rid of it.

3049. Do you make any accumulation upon the premises at any part of the year?—Not an extensive accumulation.

3050. Do you find most difficulty in getting rid of it about harvest time?—No; I do not know that there is more difficulty then than at any other time.

3051. What do you get per ton for it?—About 3*s.* a ton.

3052. On the premises?—Yes.

3053. It might cost the farmer about 5*s.* a ton upon his land?—About that; no doubt it is very valuable to land, but it is difficult to make people believe it.

3054. It may be used, I believe, as a top dressing, at the rate of about a ton per acre?—I believe so.

3055. (*Professor Way.*) I believe farmers are generally very suspicious of gas lime, as it sometimes destroys the crops?—We find that we cannot sell it, unless we go and find out customers, and then explain to them the advantages of it. We shall probably do away with the lime, and use the oxide almost exclusively, for I believe it is as cheap and more efficacious in purification.

3056. Then you will have no refuse to sell?—No.

3057. Is any of your refuse passed away from the premises?—No, not any.

3058. Do you ever change the water in your gas tanks?—No; it has not been changed in my recollection; there is a constant evaporation going on, and a constant flow of fresh water in upon every shower of rain.

3059. Do you get anything from the ammoniacal liquor, or is it taken away?—It is all taken away; it is strengthened up to 6 or 7 degrees by being passed through the scrubber in the usual way, and then it is taken away by the contractor. It is part of the contract that it should be of a certain strength.

3060. You get something, I suppose, for the gas tar?—Yes, and the liquor is taken by the same person, the contractor paying the company so much per ton for every ton of coals consumed.

3061. Then the gasworks do not now contribute any refuse, or cause any nuisance in the Kennet?—Not any whatever.

3062. (*Chairman.*) Have you any further remarks to offer relating to this inquiry?—I have had some experience as a member of the corporation in Reading of the drainage of the town, and I believe that the cesspool system is most objectionable. The evils arising from it have been modified to some extent by the adoption of a mode of drainage to take off the surface waste water, so that the cesspools do not require such constant emptying as was formerly the case; all that waste water has been diverted which before went into those cesspools.

3063. Have complaints at any time been made of nuisances arising from foul cesspools?—Many complaints, but not so many recently as formerly.

3064. A cesspool is emptied in any way that it can be emptied?—There is a certain limit as to time, a person must not commence before a certain hour in the night, or go on after a certain hour in the morning.

3065. Still the occupant of the premises must bear the cost of the removal?—Yes.

3066. And be exposed to all the nuisance so far as it can affect him?—Yes.

3067. Are you aware that the emptying of these cesspools is a public nuisance, and that it annoys other people as well as the owner of the cesspool?—It must be so to a certain extent, but as it is done during the night it is probably not noticed so much.

3068. I believe it is in evidence that the town of Reading has not suffered from cholera at any time?—I am not aware that it has to any extent, there were a few cases some years ago, after cholera had broken out in the country. Reading stands mainly upon a bed of gravel, and is, generally speaking, a healthy town. The death rate is about 1 point below the average death rate: there is no doubt the town was very healthy formerly. The custom of the gas companies in Reading before tar was found to be valuable was to pass the whole into the river, tar and ammoniacal liquor, and the tar being a heavy substance deposited itself at the bottom of the river, and there it has remained for years; it is mixed up with the mud, and there it will remain no doubt for many years to come; whenever there is the slightest disturbance the oily substance of the tar rises, and is seen floating along.

3069. Nothing would remove that, I suppose, but a thorough dredging of the river?—No.

3070. Is it not probable that the whole of the waste products and sewage of the town may be turned to beneficial account?—I think they may be; but I have not seen any evidence of the disposal of sewage having worked well.

3071. Would not Government be justified in calling upon towns to lay out money, to dispose of their sewage in some other way than pouring it into the river?—If it is placed beyond a doubt that sewage could be disposed of in an advantageous manner, I think Government might be justified in taking a step of the kind; but I think it is most important that it should be first ascertained whether this can be done.

3072. (*Professor Way.*) In the case of gasworks did the legislation precede or follow the profitable disposal

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of the waste materials?—I think that the value of the products from gas was discovered first, before there was any legislation.

3073. I presume there is no necessity for obliging gas makers now to save their tar as it is known to be a valuable product?—Quite so; there is no difficulty in disposing of the whole of the products of gas.

3074. Is there any manufactory of aniline dyes on the river where this tar is sold?—There is a manufactory upon the river not far from Staines.

3075. I understand that there is a large establishment there?—Yes.

3076. Is that Messrs. Simpson and Nicholson's?—No, it belongs to Mr. Spice.

3077. (*Mr. Harrison.*) You have stated that there is a large quantity of this gas tar still at the bottom of the Kennet?—I have no doubt of it.

3078. And that the oil occasionally rises to the surface?—Yes.

3079. The water below that is used for domestic purposes, is it not, by some of the inhabitants?—I think it is to a very small extent; I am not aware that it is used at all; there are some cottages by the side of the river, and it is possible that the inhabitants may sometimes use the water.

3080. If this nuisance can be removed by the authorities at Reading, do you not think that it is the duty of the corporation to remove it?—If the water used to any extent by the population is found to be prejudicial to health, it would be the duty of the corporation of the town, or some authorities in the town, to do so. The river is not in so pure a state as it formerly was, not so much from an increased quantity of sewage passing into it, but because there are no boats constantly passing through; formerly there were 15 or 20 in a day; there is a lock above the town and a lock below, and that causes a fall of somewhere about 5 feet, and every time that a boat passed, a body of water rushed through and carried everything before it, but now very few boats pass, and that is one of the reasons why the river is not so pure as it was.

3081. The river is now very nearly stagnant, is it not?—Yes.

The witness withdrew.

Mr. THOMAS WATTS examined.

Mr. T. Watts.

3083. (*Chairman.*) Have you paid any attention to the question of the utilization of sewage?—Yes, for a number of years.

3084. In what district or what place?—In all parts of England and Wales; I may mention that I wrote a letter to Sir George Grey on the subject of the utilization of sewage, and with your permission I will read it. (The letter was read and also the answer. A paper was read, in which indications were given of a method of purifying sewage on the banks of a stream by which the injurious matters could be separated, and the pure water sent into the river at a moderate cost, the witness stating that he was willing to dispose of his invention to the Government for 12,000*l.*, and a tenth part of the profitable income during his lifetime.)

The witness withdrew.

WILLIAM BLANDY, Esq., (of Reading,) examined.

W. Blandy, Esq.

3085. (*Chairman.*) Do you reside in Reading?—I reside in Tylehurst parish, about 3 miles from Reading.

3086. You are a banker, and hold bonds of the Thames Navigation Company?—Yes.

3087. Do you represent other bondholders?—Our firm did before the Committee of the House of Commons, to the extent of rather better than 5,000*l.*

3088. May we take the evidence given by you to the Select Committee, and printed from page 53 to page 55, as the evidence you would offer upon the same points before this Commission?—Exactly so.

3089. What is your idea as to the mode of getting out of the difficulty connected with the river Thames and its debts?—In the first place, it would require a total alteration of the constituent body, and then there should be powers to alter the tolls and to regulate the traffic.

3090. And to repair the locks?—They must be repaired, of course.

3091. Are you a Commissioner?—Yes.

3092. Are you a member of any sub-committee of the Commission?—I am a member of the committee.

3093. In the event of any general business to be done, every member of the Commission has the privilege of attending?—The committee formerly used to meet the day before the general meeting of the Commissioners, now both meet on the same day; the committee agree at their meeting beforehand that certain works are necessary to be done, and at the general meeting that is held immediately afterwards this recommendation is brought before the Commissioners, and they confirm it and give the order.

3094. They might veto instead of confirming?—Yes, but practically they seldom do, because generally speaking the committee form the great majority of the meeting.

3095. The Commissioners do not take sufficient interest to attend and to express any opinion?—Never, unless there is an election to some office.

3096. If there is an office to be given away upon which personal interest is brought to bear, you can then draw a very large meeting?—Exactly so.

3097. And then the committee doing the work might wish to appoint a perfectly efficient man, and an inefficient man with more friends to back him might be appointed by the Commissioners?—Yes, and such a case as that actually did take place in the case of the pound lock-keeper at Sonning.

3098. Do you think it advisable that that mode of conducting business should, in any future arrangement, be superseded?—Undoubtedly.

3099. Would you be inclined to sweep away the present Commissioners?—I think so, for the greater part of them have no direct interest in the river at all, Certainly nearly all those *ex-officio* Commissioners should be abolished. The members of Parliament never take any interest in the navigation at all.

3100. How would it be if the power of the Commissioners were restricted to voting for those 15 Commissioners, three from each of those five districts?—I think that the landed proprietors on each bank of the river would be more useful. We find great difficulty to get meetings at all, even with the 15; for example, this year there was an election for the committee in the borough of Abingdon, and they could not get seven Commissioners to be present.

3101. Are you aware that the opinion of counsel has been taken, and that it is to the effect, that if members of a committee order works to be done, and there shall be no funds to meet the expenditure, they will become liable in their own persons?—Yes, I am quite aware of that, and upon that the committee have acted for some time past.

3102. Is not that an effectual barrier against the committee attempting to do any efficient work?—Quite so. We see what the money in hand is, and calculate what the probable receipts for the next quarter will be, and we give our surveyor as much money as will enable him just to patch things up. We had two or three stoppages in the river last winter, and our surveyor was obliged to do the best he could. The traffic receipts this year have been rather better than they were last year.

3103. Some of the locks are in a state of ruinous dilapidation, and you must set them up again?—Yes, every year things are getting worse.

3104. Some locks are almost impassable?—Yes, some most important ones, Bell's weir, for example.

3105. Have you had any complaints made of the

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way in which the millers control the water ?—Yes, frequently, and we are obliged at times to have flashes to carry the barges over a shallow place. If a miller is short of water, he takes advantage of the flash, and will not let the water run through until it has served his purpose. One of the great impediments has been the old locks.

3106. In any future legislation how do you think the old lock owners could be dealt with ?—By taking an average of their receipts and buying up their interests.

3107. Is it not the fact that the works on the Thames are mixed up with private interests as well as with public rights ?—Yes, precisely.

3108. You have millers and their rights, owners of fisheries and their rights, the rights of the riparian proprietors, and the navigation ?—Yes.

3109. And the great water companies, too ?—Yes; to do what is necessary effectually, the way would be to have powers to purchase up all these rights.

3110. In the first place to find the money ?—Yes.

3111. How do you think that is to be raised ?—Unless the Chancellor of the Exchequer would give us some assistance, I am afraid there would be great difficulty.

3112. (*Mr. Way.*) Do you mean assistance in the shape of a loan ?—Yes, as an Exchequer loan. We did borrow money some years ago from the Exchequer Loan Office, and we repaid it all.

3113. At what rate of interest was that money borrowed ?—I think it was only 3 per cent.

3114. At what rate could Government lend money now upon good security, without loss to itself ?—I think that the traffic would pay 3 per cent. if things were put into a thorough good state of repair.

3115. (*Chairman.*) Did the bondholders look upon the security as a permanent one ?—Yes.

3116. They could sell their bonds at any time ?—Yes; and until the effect of the railways was felt in a diminution of the traffic on the river, the bondholders quite considered that the bonds were worth their full value.

3117. (*Mr. Harrison.*) What security could you offer now to Government for a loan ?—None but the chance of the tolls. There is a probability that the traffic will be kept up, and somewhat increase. That seems to be the opinion in general of those who know anything about it, even in London.

3118. Would that be considered sufficient ?—The river Thames is of importance, not merely as a highway for traffic, but to the country generally, and therefore it would be very fair to call upon Government to run some risk in a loan for the purpose of putting it in order.

3119. (*Chairman.*) Is it of more importance to Government than the river Mersey or the river Severn ?—Yes, I do think it is. The length of the river is of very great importance ; it runs by Oxford, and it runs past Windsor Castle. The Castle draws all its water supply from the Thames.

3120. Could not the Government be as reasonably called upon by the proprietors, for instance, on the banks of the Shannon to improve that river ?—I am not competent to speak to that.

3121. (*Mr. Harrison.*) Are there not persons who would be benefited by the restoration of the navigation, in such a way that they might be fairly called upon to give security ?—None who would be sufficiently benefited.

3122. Not the proprietors on the banks of the river and the inhabitants of towns ?—Not merely for the purposes of navigation.

3123. Supposing the river to be put into a proper state, so that the land should not be subjected to flooding, what would you then say ?—Undoubtedly the landed proprietors on each side of the river would be interested in that improvement, but how much it would be very difficult to estimate.

3124. Have not the old lock owners some duties to perform ?—Yes, they have to keep up the weirs, so that there is no waste water.

3125. Is that not a very important part of the navigation ?—Undoubtedly.

3126. So that it is a mistake to say that they do nothing for the tolls they levy ?—Certainly ; Mr. Blunt has a very expensive weir which he must keep up, in order to prevent the water running to waste. Of course it is also an advantage to him for his mill ; but to the extent of repairing the weir he does something for the money he receives for the tolls.

3127. If the powers of the Commissioners were to lapse, would the old lock owners be called upon to keep up the navigation ?—Yes.

3128. They have a liability in that way ?—Yes, but they have never been called upon to discharge it ; there is a liability certainly.

3129. The Commissioners, I believe, have in some cases purchased some of those old locks ?—Yes, to relieve the navigation from the expense of the old lock dues.

3130. Are those locks attached to mills ?—No.

3131. If the powers of the present River Commissioners were to lapse who would keep up those particular locks ?—Those old locks are not used for the navigation ; they are merely kept up to prevent a waste of water.

3132. (*Professor Way.*) I think you stated in your evidence before the committee of the House of Commons that your firm represented about 5,000*l.* worth of bond debt ?—Yes.

3133. And that you would be willing to take 2*s.* in the pound for it ?—Quite so.

3134. Is that feeling general among the bondholders? —I think it is ; at least I never heard but one gentleman who said that he would not take a farthing short of his full amount, if any step was taken by the Government to raise a loan to carry on the navigation.

3135. When it was fairly known that something was to be done with the river, would the bonds still be purchaseable for 2*s.* ?—I think so ; I believe that the bondholders would be very glad to take that.

3136. Would not the difference between the prospect now and the prospect then cause the shares to increase in value ?—I think not.

3137. (*Chairman.*) Is there anything further that you wish to add ?—Nothing occurs to me. The Commissioners are aware, I presume, that the jurisdiction of the Thames Commissioners extends over so much of the Kennet as is between the Thames and the High Bridge in Reading.

The witness withdrew.

Mr. Charles James Andrewes (of Reading) examined.

Mr. C. J. Andrewes.

3138. (*Mr. Harrison.*) You have been in business I believe, for years in connexion with Messrs. Exall and Barrett ?—Yes.

3139. You can state what your experience has been in the use of your steam barge ?—Some seven years ago, at the time when the rates on the railway were somewhat higher than they are now, several persons who were in the habit of having heavy goods sent from London, spoke to us upon the question of building steam barges for the express purpose of navigating the Thames, and we had one constructed under the expectation that several such barges would be required, and a company would be formed. The success of the experiment, so far as the use of steam is concerned, has been undoubted, but when it came to the practical point we did not get the support that we expect, and the barge was thrown upon our own hands. We have navigated it ever since, and the result of our experience is that I have no hesitation in saying if we could get the necessary reduction of tolls a large proportion of the heavy traffic of the town could be brought back again to the river. I speak now more particularly of heavy goods, but I am satisfied also that if there was a proper service of barges between Reading and London, which

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would be necessary for the thorough establishment of a trade, a very large amount might be recovered. The railway of course could compete, still I am satisfied that the river could hold its own as against the railway if the tolls were of such a nature as to give a fair chance to the steam barge service.

3140. Can you give us any particulars as to the expense of carriage by your steam barge ?—We are in the habit of charging according to the class of goods that are brought, from 7*s.* up to 10*s.* a ton.

3141. Does that include the tolls ?—Yes, it includes everything, bringing goods alongside the wharf. As a general rule our freights are entire freights, either of flour or of timber, (sometimes, but very seldom, coals,) and the charge that we have made pays us a reasonable and fair profit upon our outlay, notwithstanding the difficulties we have to contend with. The tolls on the up journey amount to about 2*s.* 6*d.* a ton, and on the down journey to 3*s.* 9*d.* a ton. I cannot understand why that is, but so it is, 2*s.* are paid going up to the Thames Commissioners, and a further 6*d.* per ton to the Thames Conservancy. For going down 3*s.* are paid to the Commissioners, and 9*d.* a ton to the Thames Conservancy.

3142. At what cost are the same kind of goods brought by railway ?—About the same rate ; our charges are necessarily governed to a great extent by the rates charged upon the railway.

3143. At these rates you just pay yourselves ?—Yes, and I do not hesitate to say that if a proper service of steam barges was put on, so that persons in Reading could have their goods down at fixed times, the present rates could be maintained, and even lowered, and yet pay a good dividend upon the outlay.

3144. How many voyages a week can your steam barge make now ?—On the average, when it has a full freight going to one place, and it gets a quick load and a quick discharge, we can make the voyage to London so as to return to Reading in about a week, or from that to eight days.

3145. If the navigation was put in proper condition so that the barge could pass the locks easily and without any detention from shoals, in what time could the journey be made ?—We are in this condition, that we cannot always prevent delays that arise in the discharge and loading.

3146. Are you not able to expedite the passage ?—I believe it could be expedited by working by night ; there would be no great difficulty in having a service of steamers to work by night as well as by day, moonlight or no moonlight.

3147. What time does it take now to pass a barge through a lock ?—From about six to seven minutes.

3148. With good arrangements and locks in proper order ?—About 5 minutes on the average.

3149. I have heard it stated that they used to pass through in little more than two minutes when the water was ready for them to enter the locks ?—That might be if the locks were in thorough good order and a good look-out kept. It has also been an element of calculation with us that at certain seasons of the year, if not all the year round, there might be a certain passenger and parcel traffic between towns on the river if there was a regular service of boats. A more beautiful excursion you cannot have than from Reading by the river down to London, and many persons I think would be glad to go. I believe it might be a source of revenue, although not to any great extent.

3150. (*Chairman.*) You would regard it not as business traffic, but simply as pleasure traffic ?—Yes ; I think it would afford convenience to persons going between town and town where there is no railway communication.

3151. To persons who would not object to be 12 hours on a journey that they could perform in an hour and a half by railway time could be no object ?—It might be a pleasure journey to persons desirous of seeing the course of the river and the scenery on its banks ; but as between town and town, say between Reading and Henley and so on, there would be persons who would find their convenience, either for business or pleasure, in passing by boat.

3152. (*Professor Way.*) Suppose a number of these steam barges established, would any difficulty be caused by the great speed at which they would travel ?—No ; we can run a barge at the rate of eight miles an hour down the reaches, and we are able to pull up so short as to maintain full speed pretty nearly between lock and lock. I see no difficulty with regard to the speed.

3153. Might there not be overcrowding ?—I do not think so. Suppose, for example, that from Reading there was a service of six or eight barges kept constantly going, they would not affect in the slightest degree the convenience of each other in the navigation.

3154. Would that be such a service as you contemplate to compete with the railways, and be sufficient for the supply of the town ?—Yes, if it took the whole of the heavy traffic ; so far as sea-borne coal is concerned, the natural course seems to be by colliers to London, and down by water to Reading.

3155. Do you think that the Thames above Staines should be put into the hands of the Thames Conservancy, and that they should allow the receipts upon the lower part of the Thames to stand as security for payment of the interest on the money borrowed, or should those upon the banks of the river who are interested become in some way or other security ?—The Thames Conservancy at the present time levy tolls upon all our traffic with London, and I see no reason why the whole of the tolls should not be put into their hands and money be advanced to them by Government upon security of the tolls of the whole river. I should think, without being very sanguine, that a reasonable rate of interest might be secured to Government through the Thames Conservancy. It seems to me that the whole system is not too long for the Thames Conservancy to undertake ; seeing that they already have jurisdiction as far as Staines, it would not be a great extension if they had it to Oxford, which is as far as the river may be assumed to be navigable.

3156. Do you think the riparian proprietors and the mill owners would like to hand over any interest they have in the river to the Thames Conservancy ?—I assume that their interest might be purchased, and that the purchase money would form part of the capital upon which interest would be paid, so as to reduce all under one government.

3157. (*Mr. Harrison.*) Is the Kennet above Reading very subject to flooding ?—Not so much as it used to be, I think the system of land drainage that has taken place of late years has very much reduced the amount of flooding ; that or some other cause must be in operation, inasmuch as floods are so very infrequent now.

3158. Is there any other point upon which you think you can give the Commissioners any information ?—With regard to the navigation I firmly believe that the carriage of heavy goods as between Reading and London ought to be done on the water. For such articles as timber, coal, flour, and all articles that will not bear heavy freight, water has the advantage over rail in every respect. With a through system possibly there might be a reduction of our charge for freight. Where you can carry on business on a large scale, establishment expenses are divided over a larger area, and the general result is a reduction.

3159. Do you not anticipate any reduction of the time it would take to make a voyage if the river were put into proper order ?—Yes, but you must take the average of the year through. We can, as I said before, with a tolerably quick loading and delivery, make one voyage in a week—yet practically we find in 16 weeks we cannot make more than 13 voyages. Frequently a boat is hung up a week while a lock is under repair, and all that time the wages of the men are going on.

3160. With all those disadvantages you are able just to make the traffic pay ?—Yes.

3161. If the navigation were put into proper condi-

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tion you would not have those disadvantages ?—No, they ought not to take place.

3162. What then would be the effect upon the freight ?—Of course to reduce it.

3163. (*Chairman.*) What is the mileage between here and London Bridge ?—About 80 miles.

3164. If you did eight miles an hour you would do it in 10 hours ?—Yes, but there are the detentions in the locks. You have to lower your speed and get up your speed on arriving and departing from the locks, and that occupies time.

3165. Supposing, by improvement of the river, you could make a voyage in 13 or 14 hours, you would be able to compete with the railways as far as time was concerned, would you not ?—Yes ; but it must be borne in mind that by water there is a great deal of time lost in detention at the different wharves. Where you do a general loading trade you would have to move from wharf to wharf to take in your loading. With regard to the transit of goods by railway, the experience we have of the long time which frequently occurs between the invoicing of goods and their delivery here is something fearful. It is not at all an uncommon thing for goods from the north, I speak especially of iron, to be a fortnight on the road, so that practically, with a proper service of boats, the delivery would be as speedy by the river navigation as by railway, if not more so.

3166. (*Professor Way.*) The greater part of the goods that would come by the river is wanted at the river side ?—Yes.

(*Mr. Exall.*) One great advantage in the traffic being carried on by steam would be that the heavy expense of maintaining the towing-path would be saved.

(*Mr. Andrewes.*) It was anticipated that there would be considerable damage to the banks by the wash from the steam-boat. It is found not to be so—there is no injury to the banks.

3167. (*Chairman.*) The wash expends itself on the foreshore ?—Yes.

3168. I suppose you find your boat makes the best way in the deepest and widest parts of the river ?—Unquestionably. We have been under considerable difficulties in consequence of the silting up of the channel, so that in summer time, in time of short water, we cannot load the boat—which, when quite fully laden, will draw 3 feet 10 inches of water—to above two-thirds of her real carrying power (50 tons) by reason of the impossibility of getting over the shoals.

3169. (*Chairman.*) If, instead of one barge going up once a week or fortnight, you had a dozen barges navigating the Thames each day, that of itself would have a tendency to maintain deep water ?—Unquestionably.

3170. The moving of barges through the reaches, without special dredging, would have a tendency to maintain the channel when once established ?—Yes; to equalize it.

3171. (*Mr. Harrison.*) In summer time, with that passing to and fro of barges, would there be sufficient water, as the navigation exists at present ?—Not without dredging in certain parts. The river would require to be kept in such a condition that a full load could pass up and down at all times of water, summer and winter. If this were done we should be able to reduce the freight, for with the same expense (except that of the tolls) we could carry 50 tons instead of 35 or 40. As it is now the tolls represent 40 per cent. of the whole freight. I have just learnt that the charge from Reading to London by railway is 6*s.* 8*d.* per ton for heavy undamageable goods, and it should be remembered that goods brought by railway have to bear other charges besides the railway rate ; there are the cartage charges, which form a considerable item. If the railway companies charge 6*s.* 8*d.*, the river could unquestionably compete with them if a service of barges were regularly in operation. There is all the difference between a single experimental boat and a proper service with a regular system.

The witness withdrew.

Mr. William Edward Saker examined.

Mr. W. E. Saker.

3172. (*Mr. Harrison.*) Where do you reside ?—At Shiplake mills, between Sonning and Henley.

3173. You are a miller ?—Yes, a corn miller and paper manufacturer, but both mills draw out of one head.

3174. Are you the owner of the mills ?—No, I am the owner only of machinery and plant ; I rent the mills of Captain Phillimore.

3175. Are any old lock dues taken at your mills ?—Yes.

3176. Who receives them ?—Captain Phillimore.

3177. Does he do anything at all to the old locks ?—Yes, but little. When they require repair, he repairs them.

3178. Is there a weir as well ?—Yes.

3179. Does he repair that ?—Yes, he has been at considerable expense this last summer in repairing it.

3180. Do you know the annual cost which he, as the old lock owner, has been at in the repairing of this weir and old lock ?—No ; but his father told me in his time that a large portion of the rent he received went away in the repairing of the lock and weir.

3181. Do you use the navigation at all for the carriage of your materials ?—For coals, but not for any other material ; indeed the corn mill is hardly worth being called a corn mill. I utilize it for my paper manufactory, and we merely do a little grist. We do not send goods to London by water. All the paper we send to London goes by rail, and the materials we have from London come by rail also.

3182. What distance are you from a station ?—Two-thirds of a mile.

3183. Do you get your coals by water from London?—No; from Somersetshire, near Bath, by the Kennet and Avon canal, and thence to the Thames.

3184. The navigation competes with the railway in the carriage of coals from that direction ?—Yes, although we are only two-thirds of a mile from the station, the wear and tear by road to and from the rail is such that I find it an advantage to have the coals by river.

3185. The Kennet and Avon canal, I believe, belongs to the Great Western Railway Company ?—Yes,

3186. So that they may use it as a kind of assistant to the railway for carrying their heavy goods?—Perhaps they do.

3187. Is a great quantity of goods carried on the Kennet and Avon canal ?—I do not think the Great Western Railway Company are energetic enough to make much use of it.

3188. Have you any information to give the Commissioners in respect of the navigation ?—Having lived on the navigation a number of years, I certainly do think it could be resuscitated, but very slowly. As to its eventual resuscitation I have not much doubt. The greatest injury to the navigation is; in my opinion, irregularity of water, there being little or no real preparation for times of floods. I certainly think the water might be managed better in the summer time, when there is frequently a paucity.

3189. Is there a very long weir at your mills ?—No,

3190. Might not the flood water be passed altogether over an overfall weir with advantage ?—Certainly not ; a weir for passage of water in times of floods is out of the question ; it cannot be long enough. As it is, we have nothing like sufficient exit for the water in flood times. I see a wonderful difference in the arrangements of this part of the river, and the arrangements below. Three or four years ago, in spring time, I was very much annoyed by our mills being still, probably they had been still a fortnight or more, and I went to Teddington, and there I was very much surprised to find what facilities they had for taking more water into the pool. We were being flooded here, crops were rotting, mills standing still, and all in an utterly helpless state

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with a surplus of water which there was plenty of means below to get rid of.

3191. You think provision should be made for locking off at each mill in a thorough manner when the heavy floods come?—Not only when they come, but before they come; they should be anticipated. There ought to be another set or two or three more sets of lock gates to open when required.

3192. Are floods generally attributable to insufficient waterway at weirs, rather than to the channel of the river itself being insufficient?—Yes, I think so. No doubt there are obstructions—shoals in mid-stream—but in their effect they are quite secondary to the want of means of passing the water at the weirs.

3193. Which do you find first flooded, land above or below the weirs?—It depends entirely upon the height of the land; the lowest portion gets flooded first.

3194. In your particular case whereabouts does the flood act first?—We are very exceptionally situated. In the reach between us and Sonning there are two outlets on the right hand going down, one at Patrick's bridge and one a quarter of a mile above my mills, which allow the water to pass out of the Thames into the Loddon. The Loddon empties into my tail. Consequently those outlets on the reach act in the same manner as so many gates always open. The reach between Shiplake and Sonning from having been neglected has caused more injury to the navigation than anything else on the Thames. There being two outlets of that sort four or five feet below the river, the consequence is, as a matter of course, that in short-water time the reach is regularly emptied. Ten or 14 years ago, in short-water time, in summer, we had several barges between my mill and those outlets absolutely grounded They could not get into the lock for want of water. Ten years ago I induced Mr. Palmer, who owns the land on the right-hand side coming down, to allow me for the convenience of my mill to put up midway in the largest of the two cross channels some gates about 30 feet wide. I pay him a peppercorn rent, and keep the gates in repair. I am liable to have the whole thing taken away, should the owners of the land above find the least inconvenience from it. The benefit to the river from those gates has been considerable, and since then I have never been troubled by bargemen asking me to shut down, because it is to my interest to keep the head well up, and by keeping the head well up the navigation is kept open in short-water time. No two interests can work so well together as mill occupiers and the navigation if properly managed.

3195. What were those channels made for originally?—I understand they were ditches in the first instance, and they have widened in course of time. The Loddon being four or five feet lower than the Thames, when a flood comes in the Thames there is a large efflux of water down those places, and the channel gets widened and deepened. Talking on the subject with Mr. Palmer, the late member for Reading, I observed that the channel must have got much wider through the numerous floods of late years. He got down an old plan of 1780, and we found that our outlet had increased to pretty nearly twice its former size. Those places are a wonderful relief to the head in flood times. Below Shiplake there is no corresponding relief and the water is dammed back, and my mill is shut up. In flood time the water which comes from the Loddon is forced back up above my mill, there not being sufficient efflux at Henley. Some 10 years ago, during such a flood as prevails now, when in consequence my mills had been still some weeks, there occurred what is termed a blow at the Henley lock next below me; 10 or 12 feet of earthwork on the side of the lock was forced away by the pressure of the flood-waters, the relief was so sudden that in a few hours the lands about us were cleared of water, and my mills were put to work strongly and continuously.

3196. Is there a considerable extend of land subject to floods in your immediate neighbourhood?—Yes, above, as it is all flat land; I cannot say the extent.

3197. How do you account for the flooding of that land?—I should say it is owing to the paucity of openings at Henley.

3198. Is there much difference in the level of the water in a severe flood above and below your mills?—Very little indeed, so small that we cannot make use of it for power.

3299. Is it so at the other mills, above and below?—No, they can work when we cannot. In consequence of, the outlet being so narrow at Henley, the mills below have an advantage, but it is a very small one.

3200. They pen the water more than you do?—Yes, considerably more. We feel the effect of the paucity of openings at Henley, so much the more because when we are flooded in the Thames, we are also flooded in the Loddon. When their mills are at work they draw a much larger quantity than I do—where I draw perhaps not above a dozen or 14 feet width of water, they draw 30 feet. When their mills are shut, as they are on Sundays, the paucity of the outlet makes the state of things intolerable—the floods extend enormously on Sundays.

3201. Which is the larger pond, that above your mill, or that above Henley mill?—They are pretty nearly equal.

3202. Have you any system of flashes in your neighbourhood?—If we have any at all, they are forced upon us by the flashes above.

3203. Do you consider that system to be detrimental to you?—Yes, and no doubt detrimental to the navigation.

3204. Are you obliged by the commissioners to give the boats flashes?—We are not.

3205. There is no difficulty in the reach below you?—I do not think there is; sometimes boats are hung up for want of water, but since I put up those gates I am never in want of a head of water, and my keeping up of my head is to the benefit of the navigation. If the millers draw the water down too low they not only damage the navigation but decrease their own power.

3206. The bargemen sometimes complain of the water being drawn too low by the millers; might there not be an under-water weir placed at the upper part of each mill-race, over which the water to the mill might pass with freedom, but below which the miller could not draw it?—I do not think that would meet the case. Where the head of water is divided between two or three mills, there is unfortunately that jealousy which exists in the same line of business, which sometimes leads the millers to draw one against the other, more perhaps to their own injury than to that of the public, but it is a great evil and one of the most difficult things to get over, that millers are allowed to do as they like. That is a matter that might be regulated better.

3207. Do you see any way in which provision could be made for the payment of the interest of the money that would be requisite to put the navigation into a proper condition?—The only idea I have upon the matter is, that with lower tolls and increased facilities, and fewer impediments on the line of transit, people would adopt the navigation for traffic to an extent which we now probably little dream of. I do not say that I should adopt it for my business for getting rags, on account of the time.

3208. (*Chairman.*) What tonnage of paper do you make a week?—Our average is not above 2½ tons.

3209. From rags?—From coarse rags and rope.

3210. What proportion does the weight of the raw material bear to the paper made?—About 5 tons of material make 3 tons of paper, or rather more than that in the case of fine qualities of paper, because the coarser material carries a larger quantity of refuse.

3211. (*Professor Way.*) What kind of paper do you make?—Only one sort, bag paper.

3212. Is it bleached at all?—Yes.

3213. Do you boil the materials in an alkaline ley?—In lime.

3214. You use no soda?—Not for boiling the materials; we do in the size.

3215. Do you make your own size?—Yes.

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3216. And you boil soda with the resin ?—Yes, a small quantity.

3217. Do you throw the lime refuse into the river ?—The liquid we do, but not the settlement of the lime.

3218. What do you do with that ?—We put it on the land.

3219. Do you use much bleach ?—Not one-third of what white paper makers use.

3220. How much bleach would you use in the year ?—Our general consumption is half a ton of bleaching-powder a week at the utmost. I should hardly think we used above 20 tons a year.

3221. You make a solution of that bleach in water ?—Yes, we use it in what is termed the engine. We do not make an express solution of the bleach as white paper makers do.

3222. It is put bodily into the engine ?—Yes.

3223. And washed with the pulp ?—Yes, but a large quantity of bleach, I must tell you, we leave in the paper itself. We find it to our advantage to do so. In consequence, in the course of a fortnight the paper gets rather a better colour.

3224. It bleaches after it has been made?—We do not take the bleach out of the rag as they do in the finer mills.

3225. You do not consider that any large quantity of bleach passes into the river ?—No.

3226. Or deposit from the bleach ?—No, if any deposit goes into the river that is a mere accident. I have land upon which I put the refuse.

3227. Have any complaints been made of your mill?—None.

3228. Are there any people living just below you ?—Yes, there are people on the banks. I have never heard any complaints.

3229. Not of fish being injured ?—No, not at all. In the tail of my mill there are to be seen as many fishermen as anywhere on the Thames. I do not say how many fish they catch.

3230. (*Mr. Harrison.*) Considering the small quantity of refuse which you actually throw into the river, would you consider it a hardship if Government were to call upon you to keep even that out ?—Not at all. For my own part I should have no objection to have a filter or a settling pond or anything else, so that there should not be even a suspicion that any refuse went from our mill that might do injury to the water. We should have no objection to go to any reasonable expense.

3231. (*Professor Way.*) Do I rightly understand you that you wash your stuff less than most paper makers, and do not use the same quantity of water for washing the paper ?—I think we use the same quantity for washing, but we have not spring water, and Thames water is not always clean, so that we are obliged to wash longer. We wash sometimes longer than there is any necessity for, in order to get the materials as clean as we can.

3232. (*Chairman.*) Did you ever sink wells for the purpose of obtaining spring water ?—Yes.

3233. What is the character of the ground near you ?—Gravel. I bored 23 feet and obtained a sufficient quantity of very clear water, but it contained iron. The blankets on which we make the paper were found after three or four days to be foxy.

3234. Did you draw the water through iron pipes ?—Yes.

3235. Did you think the iron came from the gravel or the pipes ?—I had an idea that it came from the pipes, but we pumped for months and found no difference.

3236. (*Professor Way.*) It is the fact, is it not, that clear water, having no kind of sediment and no iron, may still colour the pulp from organic matter in the water ?—Yes, the ordinary foulness of flood water does not injure our paper as it does white.

3237. I am speaking of white paper ; you want not only bright water, but water free from organic matter?—Yes.

3238. (*Mr. Harrison.*) Do you put whitening in your paper ?—No. I would individually have no objection to keep any refuse out of the river, but some paper makers no doubt would consider it a hardship to have to do so. English paper makers who have to use large quantities of Esparto and straw instead of rags have to use a much larger quantity of chemicals than the foreign paper maker who makes his paper from rags, and the English paper has to compete in price with a better paper ; so that the paper makers think themselves rather ill used that they should be first forceh into using an inferior material requiring the use of from five to ten times the quantity of chemicals in order to make a marketable commodity, and then be stopped from using those chemicals because they pollute the river.

3239. (*Professor Way.*) If you are able to get rid of any objectionable matter otherwise than by discharging it into the river, could not they do the same ?—I make a small quantity of paper compared to others; it is an infinitesimal quantity of anything deleterious that can go into the river from my material, though I am willing to stop that ; but in mills where they make five or six times the quantity of paper I make, it is not so easy to get rid of the refuse.

3240. If they urge the volume of their refuse as an argument for not getting rid of it, do not they admit that they contaminate the river to a great extent ?—I do not think they admit that.

3241. (*Mr Harrison.*) It has been given in evidence that soda refuse from the manufacture of Esparto paper can be utilized, and an inferior kind of soda be extracted from it at a profit. Do you know of that having been done ?—I will not say anything about profit, I know the thing is attempted to be done.

3242. Mr. Routledge, the great importer of Esparto grass, whilst he admitted that the refuse could be so utilized at a profit, stated that were the Government to order all this refuse to be kept out of the river he would at once give up his small paper mill. Do you think such a prohibition would have that effect upon small paper makers generally ?—No ; not so much upon small paper makers as upon large, because the larger the quantity of paper a miller makes, the larger the quantity of refuse he has to get rid of.

3243. Mr. Routledge did not argue in that way at all, he stated that it would be worth the while of large paper maker to put up the apparatus for extracting the soda refuse, but not worth the while of smaller ones ?—Probably that would be so, but I think a small manufactory of any sort with a proprietor of large energies is more likely to pay than a large one. I can hold my little mill well in hand, and tide over difficulties that would break the back of a larger mill.

3244. (*Chairman.*) Have you any information to give the Commissioners as to your water power in summer time ?—Since I put up those gates to stop the water running out of the Thames, my water power must have increased in summer time 50 per cent., not from quantity but from the few inches of extra head which I have been able to utilize.

3245. Can you tell us what horse-power you have in the summer time when the water is at its lowest ?—We are never without 20 horse-power.

3246. How many hours a day ?—24.

3247. What fall would you have ?—Somewhere about four feet, but I have got really six feet, because I can work my water wheel 2 to 3 feet in tail water without any diminution of power ; it averages generally about 4 feet.

3248. What sort of a wheel is yours ?—An undershot wheel, and the only wheel of the sort on the Thames. We have a curved bucket that comes out of the water in this way (*describing it*). We can work in from 5 to 6 feet of tail water with that wheel. It is called a Poncelet wheel, the principle is French, but this wheel was made by me on the premises. In the corn-mill, which is the property of the same landlord, I put in an ordinary float-wheel, and it would not move with the depth of tail water that we have. I have shown my Poncelet wheel to all millers who have chosen to look at it, but I have never succeeded in inducing anyone to get one, though I have told them I would not

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take 500*l.* a year to throw my wheel out, and put one of the ordinary float-wheels in.

3249. Have you any suggestion to offer with regard to the navigation ?—I have an idea of my own that the cheapest way of looking after the pounds would be to put them into the hands of the mill occupiers under regulations. Having myself been engaged with machines all my life I have really been much grieved to see the way in which the repairs of the locks and so on have been carried on ; the things should not have been so continually under repair. People on the spot, like the mill-occupiers, would be able to keep those things in proper order at a cheaper rate than any other parties under proper supervision.

3250. Would mill-owners not object to being obliged to open the locks from time to time as vessels came ?—No ; they could employ men to attend to the locks as well as the Thames Commissioners. The advantage in putting the locks in the hands of the mill occupiers is this : no party on the Thames is so interested in keeping the water at its proper height, and in getting rid of the flood-water.

3251. Do you occupy any land adjoining your mill ?—Only a mere garden. I have a little land of my own, five minutes' walk from the mill

3252. Can you give any information as to the effect of water on the grass ?—I have a meadow that they say is benefited by being overflowed in flood times, but I am going to have the water taken away from it as soon as possible. I have no very great faith in flooding a meadow for the sake of fertilizing it, and if any benefit to the meadow did result, that would be quite a secondary consideration to me if everybody else was annoyed.

The witness withdrew.

Mr. T. Pring.

Mr. Thomas Pring examined.

3253. (*Mr. Harrison.*) You are a commissioner of the Thames and also a bondholder ?—Yes ; and you will find my evidence at the latter part of the Report of the Select Committee of the House of Commons, on the Thames. I am here to-day to substantiate everything I stated there. I may mention as a fact that the *ex-officio* Commissioners and the bondholders are at issue (there is no use in disguising it) to such an extent that Mr. Witherington, a gentleman belonging to a respectable firm in Reading, Mr. Dryland, and myself, formed a sub-committee and wrote to all the bondholders we could find in these parts, convening a meeting. We held that meeting at Mr. Dryland's office, which was adjourned from day-to-day. The Mayor of Reading for the time was present on one or two occasions. The result was, that great disapprobation was expressed by all the bondholders present as to the way in which the commissioners had exercised their authority, and that the resolution was come to (which I handed in to Mr. Milner Gibson, the Chairman of the Committee of the House of Commons, together with the names of those bondholders who had agreed to it), that, rather than be kept in abeyance, the bondholders would sell their interest at the low rate of 10 per cent. With the exception of the Rev. Mr. Palmer, since dead, who had some antiquated notions of his own that Government would buy him up in full, every bondholder we applied to agreed to sell at that rate. The amount which those bondholders thus agreed to take, would wipe off a considerable sum of the 84,000*l.* borrowed money. Many of the bondholders have bought their bonds at a small amount, and many of those who paid the full amount are dead, and therefore the present bondholders would be satisfied with a less amount. Everyone of the bondholders I have conversed with is of opinion that the wisest thing would be to give the entire control of the navigation to the Thames Conservators. The Conservancy have managed the business so well as to make a good profit, and, if they had the entire control to Oxford or even beyond if possible, a sum of money could be borrowed, upon the joint tolls of the upper and lower navigations, sufficient to put the works in order, to buy up the present bondholders, and to deal with the mill-owners ; and the joint tolls would be fully equal to the security that either Government or any one would require for the repayment. The bondholders are perfectly willing that such a course should be adopted, but the *ex-officio* commissioners, members of Parliament, and county magistrates and gentlemen of that class are opposed to it, they object to let out of their hands this power which they have been abusing.

3254. In what respect are you at issue with the commissioners ?—I must give you an instance to show that. If you refer to the balance sheet you will find that five years ago only 900*l.* was divided among the bondholders, and an equal amount was paid to the surveyor and general clerk. The surveyor at that time was Mr. Treacher, who lived near Twyford, and no one could have conducted the business of the company worse than he did. At Sonning the works were terribly out of order, barges not being able to pass through; on one occasion Mr. Witherington asked him "How is it, Mr. Treacher, that you have not attended to the work, you have not been there for three years," and he was obliged to admit that he had not, though Sonning was so close to where he lived. He was employed at a salary of 300*l.* a year to look after the condition of those works. He was what we should call a water carpenter; he had sense enough to direct men how to drive a nail in a gate under water, and that was about the extent of it. At our own lock at Reading I saw myself the foolish way in which he acted ; a mass of sand had collected in front of the gates, and he refused to order the men to remove it. The consequence was that in opening the gates the whole gave way, and the gates were nearly torn off their hinges.

3255. What power have the bondholders to interfere ?—None whatever.

3256. Have they not power to interfere with the expenditure of money ?—Not at all. Those accounts were never audited. Not one of the members of the sub-committee appointed by the commissioners, with the exception of Mr. Blandy, had a penny invested in the concern. They were gentlemen living in the neighbourhood. At the first meeting I attended, eight or nine years ago, having bought 1000*l.* worth of bonds, I found that the salaries of the general clerk and surveyor were equal to what we were receiving, and I moved a resolution that a sub-committee be appointed with the view of reducing their salaries, more especially that of the general clerk. The general clerk, the late Mr. Graham, saw the necessity of this change I suppose, for at the next meeting, instead of allowing my motion to come on, he reduced his own salary to the extent of 100*l.* a year, but at a subsequent period, when Mr. Witherington had a similar motion to reduce the present clerk's salary, and we referred to the minute book, we found that Mr. Graham had never entered my former motion upon the minute book. He had no right to refuse to put my motion on the book, though, to avoid its being put, he had reduced his salary.

3257. Do you as a bondholder and representing the bondholders think that the government of the river is in the hands of parties who have not an interest in its management, and that it is mismanaged to the detriment of the bondholders ?—To the fullest extent that you can possibly imagine, I say that, without any qualification, no management could have been worse.

3258. Can you suggest for the future any system of management of the Thames less objectionable ?—I will first tell you how I tried to remedy it five years ago. It occurred to me that the best plan would be to have some bondholders on the committee, and I moved that Mr. Witherington, a gentleman of large property and good sound sense, living at Sonning mill, who had bought his bonds when I bought mine, should be elected on the sub-committee of our district, of whom only one, Mr. Blandy, was a bondholder. I made the motion, but I could not get a seconder. I continued this motion for five years, and it is only within the last three weeks that I have been successful in having Mr. Witherington elected on the committee. That will show you the difficulties we bondholders have had to contend with in trying to protect ourselves by putting in a man of business or two among those who are perfectly incapable of looking after our interests. For five consecutive years did I move that resolution, Mr. Witherington being willing to serve each year except one, when he refused to be elected, saying it was of no use, for the time had gone past for doing any good; however, lately, seeing that the matter was likely to be wound up, I induced him to waive that objection, and now he is on the sub-committee.

3259. Do you think if the management had been in the hands of those really interested pecuniarily in the Thames it would not have been reduced to its present condition?—I think so. I will give you an instance of the way in which they manage it. Through last year we had a series of meetings at the Great Western Hotel with the view of reducing the tolls, and we came to the unanimous resolution that they should be reduced one-third; the understanding being that the lock-owners and the mill-owners should work with us, which they agreed to do to a great extent, but not unanimously. However, in the meanwhile the commissioners were to exert themselves to induce the different barge owners and persons who were in the habit of receiving and sending out large quantities of goods, to send them by water, in order to keep the river open and resuscitate the trade. I waited on Messrs. Huntley and Palmer, who had given up their contract for coals by water, and induced them to resume it. The Gas Company also, of which I am a director, was negotiating to have large quantities of retorts and firebricks brought by railway. I exerted myself to have that brought by water. We arrived at the point that it was all but settled, indeed a tariff of charges was printed and circulated amongst the barge owners and those who would carry on the traffic, which cost us some 10*l.* for printing, and the final result was that our new surveyor, at the last moment, suggested to our chairman, who, by-the-by, is past business altogether, "If you lower these charges it will increase the trade, and the locks and weirs and gates are so far worn that you will not be able to do your business." Accordingly we had to compensate two or three persons for non-fulfilment of contracts, and I had to look foolish and go to Messrs. Huntley and Palmer and say, "Have your coals by rail, for it has all dropped through," and our gasworks material was brought by rail also. The entire cost must have been at least 40*l.*

3260. Do you think there would be any objection on the part of riparian proprietors, mill-owners, and the different people on the river, to its being handed over to the Thames Conservancy?—Mr. Saker of Shiplake, Mr. Blount at Mapledurham, and Mr. Witherington at Sonning, agree entirely. I have had no means of communicating with the mill-owners up and down the river, except those I have mentioned.

3261. Can you speak to the view which the proprietors of the land adjoining would take of such a proposition?—I should suppose in the case of a gentleman, whose park the river passes through, the better the state that the river was kept in the better he would be pleased, and he ought not to object to a small tax. The only objection I have heard is from the *ex-officio* Commissioners.

3262. Do you think that the landowners would be willing in any way to bear the responsibility of paying the interest of the money required to put the river into order?—I do not think they would be content to pay any portion of the expense.

3263. You think the management of the river should be placed in the hands of those who have a pecuniary interest in its maintainance, and not in the hands of those who have not?—Yes; at present, unless a clerk is to be appointed or a new surveyor, we can hardly manage a quorum; but, if there is any event of that sort, we have a crowded room and the bondholders are outvoted. The bondholders have only asked 10,000*l.*, and the Commissioners have property to double that amount in towing-paths and land and houses between Staines and Oxford; but under our Act of Parliament we, the bondholders, cannot realize to pay ourselves.

3264. You could take possession of the locks?—Two of us proposed taking possession of Reading lock, but we found that we should subject ourselves to a Chancery suit, that we could not hold the tolls, but should have to share them among the body of bondholders, and it was not worth the risk. I wish to mention one matter as showing the loose way in which business is managed. Lock-keepers in certain parts make a very good thing of this place, inasmuch as there is a good deal of pleasure traffic, and all the sixpences they take for pleasure boats are their own. When Mr. Walter, one of our bondholders, who was present at the meeting at Mr. Dryland's, heard that we were paying three men 12*s.* a week to attend to three locks, he said he would take those three houses, paying the Commissioners the sum which the Commissioners were paying the three men, and he would make a profit out of it then. In some districts as much as 3*l.* a week is taken on certain occasions, such as the Henley and Maidenhead Regattas.

3265. Would the present bondholders object to be postponed to a new set of preferential bondholders?—I should be more pleased to agree to that than to take 10 per cent. and give a receipt in full. But in my opinion the bondholders would not agree to it. The bondholders do not object to the Thames being handed over to the Thames Conservancy. You have been told, and will be told again, that they object, and that it is centralization and all sorts of wrong things; but we think the surveyor to the Thames Conservancy is really a surveyor and not merely a water carpenter, and he would lay out the sills and do the work properly.

3266. (*Professor Way.*) You think it is the general conviction of the inhabitants of this district that the navigation should be handed over to the Thames Conservancy?—All I have conversed with have said we could not do a better thing.

3267. Should we find at Oxford a greater or a less number of people than at Reading who would object to the handing over of the Thames to the Thames Conservancy?—At Oxford probably there would be great opposition, because there are so many clergy there. The conservancy officers say that they would not object to send one or two of their body into any district, and one or two efficient men would do the work much better than we have had it done, because our work has been done in the loosest possible way. Mr. Witherington, at one of the Commissioners' meetings, declared that he could get gates made for 50*l.* such as those for which the maker charged 80*l.* to the Commission, and that the men set to work at Sonning were not looked after by the surveyor.

3268. (*Chairman.*) Is there any yard belonging to the Commissioners for the repair of gates?—They have one on the Kennet, and they had a very valuable pair of pumps there built by Philips, and they built a shed to put the pumps in. The man at the lock will show you the sheds, but the pumps have never been placed there. They are outside still, and have rotted away, so that they are not worth the wood or iron they are made of. We should have bought them at the gasworks if they had been taken care of.

3269. (*Professor Way.*) Looking at the question apart from being a bondholder, would you say that to place the management in the hands of the Thames Conservancy would be an arrangement most likely to conciliate all interests?—Having been born in London and lived in it nearly all my life, and having a better opinion of London than countrymen, I should say let the Londoners have the management for the future. Although no work of importance has been executed during the past year, the whole of the receipts, some 3,000*l.*, have been expended.

The witness withdrew.

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Mr. CHARLES CLARKE examined.

3270. (*Mr. Harrison.*) What is your business?—I am a partner in a firm of lead merchants in Reading.

3271. Are you well acquainted with the river Thames?—I have known it nearly 50 years at Hammersmith, Teddington, and Reading.

3272. Have you known it by being on its banks?—Yes, I was born on its banks. I have watched the gradual and, latterly, the rapid pollution of the Thames much to my annoyance.

3273. Do you find the Kennet polluted?—Yes, the Kennet proper.

3274. And increasingly so?—Yes; the Kennet from just above the town through the town to where it enters the Thames is in a deplorably filthy state, and I think that you should look at the question of the pollution of the Thames more as a national one than anything else, because the inhabitants of London and the whole of the Thames valley depend for their supply of water upon the Thames, and I believe the Thames is getting so bad that, under certain atmospheric influences, it is just possible that it may poison half London. I have seen as many as 15 or 20 dead dogs, cats, pigs, and sheep, besides filth from manufactories, from the hospital, from the gaol, and a great part of the drainage of Reading, coming into this water supply for London.

3275. Do you mean that you saw all those dead animals at one time?—Yes, in different parts. I think the question of the traffic on the river Thames is a matter of very small consequence, as compared with the health of the city of London and the whole of the Thames valley.

3276. Is not the remedy very simple, as far as the creation of nuisances from Reading goes, viz., that you should sewer the town properly, and take the sewage upon the land?—I think so; no doubt the drainage of Reading is very easy, as in fact the drainage of all towns is, but the difficulty is to know what to do with the sewage.

3277. Reading has had a board of health for a great number of years, and yet the river adjoining has been allowed to become more and more foul year by year. Would it in your opinion be a proper thing for the Government in a case of that kind to say, "You shall sewer, and you shall not turn this sewage into the river"?—Certainly it must be stopped; whether you do it now or after 100,000 or half a million of people have been poisoned, you must do it.

3278. Can you speak to the condition of the Thames further up?—I rent the water that belongs to the Crown for the purpose of preserving it for the inhabitants to fish in from Tilehurst parish to St. Giles's mill in Reading, and therefore I have been from time to time on the water, and constantly by the side of it. But the Thames above Reading is comparatively clean as compared with the Kennet after taking the drainage of Reading.

3279. Have you observed much difference in the quantity of fish in the Kennet?—It depends upon the sort of fish. You may see fish living on the top, but the bottom of the Kennet is saturated with gas tar. If you were above the lock and dipped a cane into the bottom you would get an inch or two of gas tar and mud. A fishing line becomes coated with it. There fish will not live, but on the surface of the water where there is fresh water, you see small fish and fry doing very well. I think some fish, tench for instance, will live in water totally unfit to drink. I do not think any inference as to the purity of the water can be drawn from the fact of fish living in it. But at present, when the men who catch fish to keep put them in the punt wells, the fish all die in about two days, whereas they could formerly keep them for weeks.

3280. Have you observed from time to time alteration in the condition of the Thames as a navigation?—Yes, of course; the weeds have grown. If the barges do not pass, the weeds continually grow; but as regards the navigation of the Thames, I think it is a thing gone by—as stage coaches and broad wheeled waggons have gone by. Looking at the two circles of railway now being made round London, that will connect all other lines, persons will not trouble themselves about the conveyance of goods upon the river at all. My nephew has a landing wharf at Hammersmith, and we could take goods to and fro between there and Reading by water, but there is the tide to contend against. If we were going down we might meet the tide at Isleworth, and there we must stop till the tide turns, and the same coming up.

3281. Have you any interest in the Thames bonds?—No, the only interest I have in the Thames is the fishing in the Crown waters.

3282. What frontage have you?—About three miles, from Tilehurst parish to the mouth of the Kennet, and a mile and a half, perhaps, from there to St. Giles' mill.

3283. What is the rental?—5*l.* per annum.

3284. Have you any expenses in watching or preserving?—Yes.

3285. If persons fish in that portion of the river, have they to ask your leave?—No, not if they angle. I took it because if strangers to the town of Reading had taken that water they could have prevented persons angling there. The two members and other gentlemen pay me subscriptions which balance my outlay, and I am only at my trouble. I do it to preserve the fishing for the poor people. I have tried to induce the corporation to guard the river, but they will not do it because they get no gain out of it.

3286. Have you taken any steps to take the dead animals out of your water?—No.

3287. Is it done by anyone?—I do not think it is done by anyone. They remain on the top while they are large enough to float, and when they burst from the gases generated, they sink and the bones go down. At Hammersmith I have seen boys continually go out and get heaps of bones and sell them to the marine store dealers.

3288. Are there any cray fish in your district?—Yes, in the Thames. I do not know anything about the Kennet; in the Holy brook there are. In the Thames fishermen get a great many at times when the water is low, and there are some very good trout in the Pool at Caversham. This last season there were a few good trout caught there.

3289. (*Professor Way.*) Do you think that any measure for restocking the river with fish would be comparatively useless, so long as the river remains in its present state of contamination?—That would depend upon what kind of fish was sought to stock the river with. In the Thames at the present time there is very good fishing. A day like this you might catch 20 brace of perch and three or four jack. It is of no use turning salmon in at Hampton, or anywhere else. If they went through the Pool water at London I do not think they would return again.

The witness withdrew.

Mr. T. Pring.

Mr. THOMAS PRING further examined.

3290. (*Chairman.*) Do you wish to add anything to what you have already stated?—With respect to the probability of the navigation paying, from calculations I have made and from positive contracts we made at the gasworks, we know that it would pay. At the gasworks we have had coals by water and also by rail, and we find that by rail the breakage is such as to more than counterbalance the saving in the carriage. If the tolls were reduced one-half the balance would be in favour of having timber, coal, and iron, by water conveyance. For certain goods the railway charge 1*s.* 8*d.* a ton from the station to the works for land carriage in addition to the 7*s.* which we pay for bringing them to the station.

Mr. T. Rogers.

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Mr. Thomas Rogers further examined.

3291. (*Chairman.*) Have you any further suggestion to make to the Commissioners ?—I think the bed of the Thames requires an immense deal done to it on the shallows ; and the ballasting so obtained would be valuable stuff.

3292. What would be the value of the material so obtained ?—That sand would be worth here 3*s.* or 4*s.*, or 4*s.* 6*d.* a load.

3293. If taken in large quantities would it fetch that price ?—Yes. They are getting 4*s.* a load for their best sand here, and that is not as good as the Thames sand. Then there would be the coarse gravel for road making, that is worth 3*s.* a load.

3294. (*Mr. Harrison.*) So that you think that the expense of ballasting that might be required would be almost met by the value of the material taken out ?—Quite, near a town.

The witness withdrew.

Mr. Alderman Darter.

Mr. Alderman Darter examined.

3295. (*Mr. Harrison.*) Can you speak to the value of the ballast taken from the Thames ?—I had some land at Wargrave, and bought several hundred cube yards of sand taken out of the Thames, which I found most useful for building purposes.

3296. Is your land subject to flooding ?—Yes. About three years ago I bought a piece of land near Wargrave for the purpose of building a small fishing box, and I bought a quantity of bricks for the erection of the house, but I found that the place was subject to flooding, and that, according to levels which I had taken for the purpose, a flood must have been three feet deep over the land, so I got out of my bargain by selling my bricks and my land.

3297. Have you any further information to give the Commissioners bearing upon this enquiry ?—With respect to the discharge of sewage into the river, a good deal goes in. There are privies over the Kennet the sewage from which enters the Kennet in the first instance, and if the Kennet is polluted that pollution will reach the Thames at the junction. The great fault in Reading is that the surface water is allowed to run into the cesspools, so that it renders it necessary that they should constantly be emptied ; and very frequently in courts where there are a lot of cottages no effort is ever made to empty the cesspools, the consequence of which is that the fœtid water flows all over the surface. For instance, in a town supplied with water at high pressure, if the ball-tap stops down from any imperfection the water continues to run, and in nine cases out of ten it runs into the cesspool, and the cesspool overflows. If a cesspool 25 feet deep were not subject to that influx of water, but were kept wholly for watercloset purposes, the probability is that it would last 20 years without requiring to be emptied, and you would have the fertilizing properties of this sewage to apply to land.

3298. You do not think any would flow into the river ?—No.

3299. In your opinion should Government order the people of Reading not to pollute the Kennet as they do now ?—Yes, if they find a remedy—if they tell us what else to do. I was on the local board many years ago, and we went to the general board in London for information as to what we were to do ; we are as much abroad now as we were then. It would be easy enough to get an injunction to restrain us from draining into the Thames in a partial way as now, but unless you point out a remedy, and indicate an outfall, it would be a cruel thing to do.

The witness withdrew.

Adjourned to to-morrow at 10 o'clock.

Reading, Thursday, 16th November 1865.

Present :

ROBERT RAWLINSON, Esq., in the Chair.

John Thornhill Harrison, Esq. | Professor John Thomas Way.

Godfrey Lushington, Esq., Secretary.

Mr. H. Simonds.

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Mr. Henry Simonds examined.

3300. (*Chairman.*) Are you a brewer carrying on business near Reading ?—Yes, our brewery is situate on the Kennet.

3301. Do you use the company's water or the water of the Kennet ?—We use springs, in the very centre of our yard ; and, though close to the Kennet, we get our spring water direct from the Thames—we know they are Thames springs, for they rise and fall with the river.

3302. Have you more wells than one ?—Yes, two wells.

3303. At what depth are they ?—Not very deep ; from 12 to 15 feet would bring us any quantity.

3304. Does your water rise and fall with the Thames ?—Yes, utterly irrespective of the Kennet. The only way in which the Kennet affects us is when there is such a high flood that the surface water comes into the yard.

3305. What height would the Kennet have to rise from low-water level so as to flood your yard ?—Quite 4 feet.

3306. Is there much sewage passed into the Kennet by houses situate on either side of it ?—A great deal below us ; and above there is constantly a quantity of lime water going in from the tannery. The tanners use lime to a very great extent, and something else. It is no uncommon thing for the river to come down perfectly white for an hour at a time.

3307. Has that discharge into the water been going on for some time ?—The discharge of lime water has been going on more or less for the last ten or fifteen years, but it has increased of late.

3308. Are there any fish in the Kennet ?—Yes, but the lime water kills them.

3309. Do you remember the time when the gas company turned their waste material into the river ?—Till yesterday I thought they did so now. I know there is a quantity of gas tar at the bottom. If you throw a bullet in at the end of a line you bring it up covered with gas tar.

3310. What number of men do you employ in your brewery ?—About 70.

3311. Does the sewage of your property pass into the Kennet ?—The sewage of the brewery, properly so called, goes into the Kennet ; the house sewage goes into cesspools.

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3312. How often do you empty those cesspools?—As they are full they are emptied from time to time at night, and a very great nuisance they are.

3313. Do you take the refuse on to your own land?—We pay so much by contract for having it taken away—what the men do with it we do not know.

3314. Have you any idea what it costs you to empty those cesspools?—No. I daresay it costs four or five pounds a year, on the average.

3315. When they are emptied a great nuisance is caused?—Yes, the largest is within 35 feet of the house.

3316. Do they use any disinfectant?—Yes.

3317. Is there a paper factory established above the tanner's?—No, it is between us and the tanner's.

3318. Do they at any time cause a nuisance in the river?—Upon four or five occasions they have.

3319. What appearance did the nuisance present?—Once the liquid was perfectly black, and once it was of a perfect chocolate colour; at other times it came down during the night and I did not see it.

3320. Were any steps taken to prevent it?—I complained of it to the board of health, and the inspector of nuisances went to the man, who at once admitted that he had emptied two pits of poisonous matter into the river, and that this poisonous matter came from the new patent process of reducing wood and fibre into pulp for making paper by means of certain chemicals. It was unnecessary to take any further action in the matter, for the man guaranteed not to do it again. He has since left the works and gone elsewhere.

3321. Are the works now carried on by other parties?—No.

3322. Were they stopped in consequence of the process being objected to or for commercial reasons?—It was because he had not room to carry out his designs.

3323. Do you use water power for your brewery purposes?—Steam power.

3324. Do you use the river for the purposes of navigation?—Occasionally.

3325. How far is the Kennet navigable?—A barge can go to Bristol by the Kennet and Avon canal.

3326. Do you know what condition the navigation is in between London and Reading?—Yes, very bad. The river has silted up in so many places within the last few years.

3327. If the river could be put into an efficient state, would there be any probability of a moderate traffic coming back to it, so as to pay for keeping it in order?—No, we might send beer occasionally, and we have sent beer by the steam barge; we have sent down 100 barrels at a time for export; we can send it down into the Pool and deliver it at once, and thereby save the carriage through London.

3328. Have you any idea as to whether the river should be maintained for other purposes apart from its paying traffic?—The millers will maintain it for you; they cannot help it, for they dare not let the water run by them. Suppose, for example, that to-morrow a flood came and swept away one of those locks, the whole body of water would rush down, and when it had all rushed away the miller would have lost his head and the mill would be useless. To prevent this the miller would put up a dam at his own expense for his own water power, and he must maintain the locks. A dam across would stop the navigation, and he would go to work in the most economical way.

3329. Is it proper that the state of the river should be at the mercy of the millers?—I give no answer as to whether it is proper or not. I say that the navigation will not pay commercially; you will never make it pay.

3330. Do you know anything of the constitution of the Thames Commissioners?—Yes, I know that they are far too numerous, so large that they cannot work.

3331. Are you a Commissioner?—I have never qualified; I could be a Commissioner.

3332. (*Professor Way.*) Nothing passes from your premises into the river?—No, with the exception of cask cleansings, and they are very attractive to fish. We can catch more fish off our premises in ten minutes than anywhere else in an hour.

3333. Are the grains carted away?—Yes, and the yeast in the same way we sell, and the spent hops are all sold for agricultural purposes.

3334. (*Mr. Harrison.*) Are you acquainted with the valley of the Kennet above Reading?—Yes.

3335. How is that affected by flooding?—It has been all altered since the last five or six years; formerly the table land below Mortimers was all undrained, and when a great quantity of rain fell on it the water was held there and filtered gradually through the gravel—the flood was a very long time before it got here, and remained a long time when it came.

3336. At what part did that occur?—All along the length of the table land up to 10 or 12 miles from here.

3337. Is the subsoil gravel lying on the London clay?—No; I do not think it is the London clay.

3338. What has been the effect of the drainage upon the land?—Most of it belongs to Mr. Benyon; he has gone into a great system of drainage by main drains quite the breadth of this table, and very deep, and then at intervals he has little minor drains going into these large arteries. Now and then a flood comes down within 24 or 48 hours after the rain has fallen, it comes down with a rush, and passes into the Kennet and out into the Thames before the Thames has actually changed colour; I have known the Kennet turn bright again, so that you might fish in it, before the flood water came into the Thames; and yet the floods in each river were caused by the same rain.

3339. This is the river Kennet (*pointing to the map*) running up in this direction?—Yes, and I can show you where all the water comes from; it is the whole of that district that has been drained (*pointing to the map*).

3340. That (*pointing to the map*) is the Bagshot Heath sand?—Yes, the greater portion of it; there is a good deal of clay when you get off the Bagshot formation, and that has all been drained; the whole of that part has been drained (*pointing to the map*); it comes down there (*pointing to the map*), and the level of the land is below the level of the Thames, consequently the water gets penned back; I have known the hay to remain uncut during an entire year, since the formation of those drains; two years ago it was never cut—now that part (*pointing to the map*) is under water although the river is perfectly clear.

3341. Have you any idea of the number of acres which Mr. Benyon has drained?—No, but he has drained very largely; his agricultural improvements are upon a very large scale.

3342. And the effect is to bring the flood down very rapidly?—Yes; in less than half the time that it took before.

3343. Does it remain as long a time?—No; as a rule, we are not so liable to floods, they pass off into the Thames.

3344. The effect upon the land in the valley is that it is flooded?—Yes, in that particular part the water is kept back above the mills below Reading.

3345. Is there any difficulty about the drainage of the land?—Yes, the level of it, I think, is below both the level of the Kennet and of the Thames. I think they must tunnel under it to get the water away.

3346. Further up the valley is the land adjoining to the Kennet difficult to drain in consequence of the river having been converted in places into a canal?—Yes. If you took away every lock upon the Kennet, and allowed the river to run its own natural course, it would act as a natural drain to all that district; the Kennet is very quick, there is a considerable fall, but penning it back prevents the drainage to some extent.

3347. You think that the Kennet as now canalized does injuriously affect the adjoining land?—Yes.

3348. Does this injurious influence extend far up

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the valley of the Kennet?—As far as Newbury, I should think, at any rate, or further still—to Hungerford.

3349. In some parts of the valley there is an extensive system of irrigation, is there not?—Yes, water meadows, and no doubt that system might be carried out further.

3350. Lower down the river?—Yes, there are extensive water meadows round Kintbury and Woolhampton.

3351. You could not have a good meadow if the land was waterlogged?—No.

3352. And so where these water meadows succeed the land drainage is not affected by the river?—No.

3353. Are these water meadows above the point that you mentioned just now?—Yes, considerably.

3354. Is the land much deteriorated in value by being subject to these floods?—The increased value of the land which is drained is far greater than the damage which is inflicted upon this part where the water settles.

3355. Of what extent is that part that is so injured by the water settling?—I should say 400 or 500 acres.

3356. That is the part which you think could not be drained without being tunnelled?—Yes, I think it could not be drained without great difficulty.

3357. (*Professor Way.*) You have said that you knew by analysis that the water you used in your brewery came from the Thames; is the water very hard?—Yes.

3358. Do you recollect what its degree of hardness was?—I can furnish you with the exact constituent parts. Dr. Letheby has analysed it.

3359. Is hard or soft water the best for brewing?—Soft water is required more for porter and stout, and hard water for pale and bright ale.

3360. The color is reduced by the hardness of the water?—I can hardly say that, but the ale gets more "brilliant."

The witness withdrew.

Mr. Richard Lloyd (of Sheffield Mill, near Reading,) examined.

Mr. R. Lloyd.

3361. (*Chairman.*) You have attended to give evidence as to a paper mill that is situate on the river Kennet?—Yes, the Sheffield mill, in the occupation of the Kennet Paper-making Company.

3362. How long have the works been established on the Kennet?—For 50 or 60 years, I fancy.

3363. How long has the present company possessed them?—Three years.

3364. Has the company extended the operations of the mill?—Not the size of the mill, but they turn out rather more paper.

3365. Have they at all altered the character of the paper made?—Slightly; the same materials are not used.

3366. Is the power used at the mill water or steam power?—Both.

3367. Do you remember what the water power is?—We calculate it at about 90-horse power with a good head of water. The steam power at present in use is about 45.

3368. Are the wheels breast-shot or ground-shot, and how many wheels have you?—Four in constant use. We have seven wheels, but three of them, finding the water power very precarious, we have been obliged to shut down, and to put steam power in their place. When we have a good head of water we can work all seven. We find that the water varies, particularly on Mondays; we seldom have any water then, and we have never been able to ascertain why; the only explanation that I can give is, that the meadows above us for miles are irrigated on a Sunday; but just now this appears to me not likely after such weather as we have had lately, and yet on the last two Mondays we have been almost as badly off as usual.

3369. Is it not probable that the millers above pen their water back on Saturday night?—Yes, that is possible, but I do not think that would affect us to such an extent.

3370. (*Mr. Harrison.*) Have not the farmers power to irrigate on other days than Sundays?—They have not power to irrigate at all in my neighbourhood without asking leave from the millers. I believe that above us they are not so strict.

3371. What weight of paper do you make a week?—About 18 tons.

3372. What materials do you use?—Esparto grass and waste papers—papers that have been before printed or written on.

3373. Do you use any rags?—No.

3374. In about what proportion do you use the two materials you have mentioned?—About 75 per cent. of waste paper and 25 per cent. of Esparto grass.

3375. Do you convert the Esparto into pulp, or do you buy it already converted?—We convert it ourselves upon our own premises.

3376. What weight of raw material do you use to produce the net weight of paper?—There is about 30 per cent. of loss in the process.

3377. Do you use much water for washing the material?—A great deal.

3378. Do you use many chemicals in the process?—Yes, soda ash made caustic by lime and boiling.

3379. What do you do with the waste products?—We let the liquid portion run into the river—the solid portion we retain on the land.

3380. Does the liquid portion contain any ingredients poisonous to fish?—We do not find it so; we find that there are as many fish now as there were when we first went there.

3381. Have any complaints been made?—Yes, there have been complaints from one person only—Colonel Blagrave; he has complained to us, and also written letters to the Reading papers complaining that the fish were killed, and that the cattle refused to drink the water.

3382. Is it possible by any process to prevent that liquid going into the river?—It would be possible to prevent the waste liquid going into the river as it does now, but I do not think it would be necessary to prevent its going in altogether; we can filter it, and we are about to erect some reservoirs for that purpose. The water will then leave behind all the organic matter.

3383. Does it contain any material that would be injurious to vegetation if it were put on land as it leaves your works?—It would be rather beneficial to the land; it would not kill vegetation, for whatever it collects on the banks vegetation is very rich all round it. It is like many other manures, put on injudiciously it would do mischief, but applied judiciously it would be beneficial; that is only my opinion.

3384. You are now going to carry out works to abate the nuisance?—Yes; we had a gentleman in last week from Scotland who has been superintending some works of the same kind there, and we have had him come here on purpose. He has furnished us with a plan which we intend to adopt.

3385. Do you use the river for navigation?—Not at all; we should do so, but the navigation is in such a bad state from Reading to London that we feel that if we were to put on a steam barge, or a number of barges, our business would be considerably interfered with.

3386. If the river was in a reasonable state of repair to enable you to make voyages with comparative certainty, would you prefer using the river?—Most certainly, because we could load both ways—with material one way, and with manufactured goods the other way.

3387. What do you pay per ton for materials brought by railway?—For raw material 7*s.* 6*d.* per ton—that is, for waste paper or for rags, if we use rags from London.

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3388. Is that the charge for delivering on your premises?—No, it is not; that is for carriage from station to station. We have carting besides from London to Paddington, and from the Theale station to the mill.

3389. What does that cost you extra?—I think it is 3*s.* in London or 3*s.* 6*d.*; we do it with our own carts at this end.

3390. What amount would you put the last at?—I have never calculated that.

3391. What is the distance in miles?—Something under half a mile.

3392. Would 6*d.* a ton do it?—More than that; it would be 9*d.*

3393. That would make the expense about 11*s.* 6*d.* altogether?—Yes.

3394. What reduction upon that would enable you to send your traffic by the river?—A few years ago I carefully went into the details of all the dues down the river, and found that it would be a saving to the mill of something like 250*l.* a year, supposing the river traffic was conducted with certainty.

3395. (*Chairman.*) Have you wharfage alongside your own premises?—Yes.

3396. There would be that advantage in addition, that you could load your boats alongside your own wharf?—Yes, there would be no more trouble to load a barge than there would be to load a cart to go to the station.

3397. How should you be situated as to the unloading at the London end? Would the river wharf there be as near to you as the railway station is now?—Yes, and a great deal nearer. The river wharf would be almost as near to us as at this end, for our warehouse happens to be close to the river Thames, and the station is three or four miles off.

3398. As the streets of London are notoriously choked by traffic, and especially by heavy traffic, do you think there would be an advantage gained by taking as much traffic upon the river as possible?—There is no doubt of it. We frequently miss the day's train in London; our goods are sent away, and we give the men who take them a certain time to go from the premises to the station, and they meet with a block in the street and arrive too late for that day.

3399. (*Mr. Harrison.*) Are we to understand that the saving you mentioned just now would be even at the present rates that you pay?—Yes.

3400. It is merely the uncertainty of the navigation that prevents your using it at present?—Precisely.

3401. If the rates were reduced and the lock dues reduced, that would be an additional encouragement to you to send your goods that way?—Yes; I should have mentioned, when I spoke of the uncertainty of the navigation, that one great bar to the river navigation is the excessive dues payable at all the locks.

3402. (*Chairman.*) You mean the old lock dues?—Yes.

3403. For which they give you no equivalent?—No. It appears to me that the men who have had the management must have been rather benighted for many years, for three tons of goods at 6*d.* a ton must be a great deal better than one ton at a shilling.

3404. You have not qualified as a Commissioner?—No.

3405. You would, I presume, be able to qualify by virtue of your property?—I presume so, but have not thought it worth while to do so.

3406. Do you reside on the banks of the Thames?—Yes, at Henley.

3407. How long have you been resident there?—12 years.

3408. Have you noticed any alteration in the character of the river since you have resided there?—I have noticed that we have a great deal more short water in the river than there used to be. The river has become very much more choked with weeds.

3409. Have you suffered any nuisance from dead dogs and other animals that are found floating in the river?—No.

3410. Do you use the river much for pleasure purposes?—Yes, my house is close to it. I have seen that sort of thing now and then, but not to any great extent.

3411. Do you experience any ill effects from river floods?—No.

3412. You are perhaps situated beyond reach of floods?—No; when the water is out it comes to my garden, but we have never experienced a flood to continue for any time or to do a very great mischief.

3413. Is your house situated in its own grounds?—Yes.

3414. Do you drain into the Thames, or have you cesspools?—Into a cesspool; but I use all the sewage of my house upon the land.

3415. As to houses similarly situated to yours which drain direct into the Thames, do you think there would be any hardship if they were compelled to utilize their own sewage?—If they had garden grounds they ought to be obliged to any person who made them use it, for I find it exceedingly beneficial to utilize my own sewage, and I suffer no inconvenience from it.

3416. Do you think, as a matter of pounds, shillings, and pence, it is economical so to use it, and not to waste it into the river?—Yes, it saves me some 20 tons of manure per annum.

3417. And you use it voluntarily?—Yes, I have done so for the last nine years.

3418. Do any of your neighbours take the same precautions?—I do not think they do.

3419. Do they drain direct into the river?—No, I think they drain into the soil; it is a chalk soil. I believe they are content to dig a cesspool and let the matter soak through and take its chance. On my side of the river I know that there are none of the houses, except those close to the river, that drain direct into it.

3420. How do you use the sewage?—Simply by ladling it out with a large zinc bowl, stirring it up each time before it is used, and putting it into a watering pot or watering cart and diluting it with water.

3421. Your gardener has your instructions to use it when he requires it, and you know that he does use it in that way?—Yes, and he is always well pleased to use it. I have had three gardeners in my employ since I have had that system in operation, and they have all of them been very anxious to find sewage in the cesspool to use.

3422. For what plants do you use it?—For all vegetables and celery; it makes that very fine and strong.

3423. Do you grow roses?—Yes, and my gardener uses it for rose culture.

3424. For any other flowers?—Not I think for the bedding out plants; but I know that he does use it for roses. I believe he finds it rather strong for the others; it is chiefly useful for vegetables, Brussels sprouts, and annuals; he uses it also very constantly for grape vines and for borders.

3425. From the experience you have had, do you think that you may reasonably hope to be enabled to conduct your works in such a manner as to remove all cause of complaint against you?—I think so; I cannot help expressing an opinion that the outcry made has been rather uncalled for, for I do not think that we have done anything like the mischief that is supposed; at the same time, feeling that we may do it, we are quite prepared to take such steps as we can take in reason to obviate any nuisance that we may possibly be at present guilty of. When we look to the state of the river about us we find that there is a vast quantity of fish in it. Last week I met a gentleman who told me that he had caught 70 perch close to our mill-tail, and I think that when the Commissioners were at the mill they saw two very fine jack lying right under the mill-tail, where the stuff comes in. When we find that this is so we cannot feel that we are fairly subject to the remarks that have been made about us.

3426. If you utilize voluntarily the refuse material of your mill, you think it only just and proper that others should be compelled to do what you find you can do with advantage?—Yes.

3427. For instance, if it were practicable to make

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paper without fouling the river, would you say that it is the duty of some authority to see that paper is made without fouling the river?—Certainly, if it can be done without fouling the river.

3428. I mean if it can be done reasonably; if it can be done without ruin to the trade?—Precisely.

3429. If keeping your refuse out of the river puts a per-centage upon your paper, it would be only fair that you should have protection by all persons likely to come into competition with you being put under the same conditions?—Precisely.

3430. You use so large a volume of water for washing that you think it would be rather difficult to filter the whole body?—Yes.

3431. (*Professor Way.*) In washing the paper you remove the largest portion of the alkali in that part of the process?—Yes; that is, supposing we are washing for two hours, in the last hour the chemicals going into the water are very much smaller in quantity than at first.

3432. Probably nine-tenths of the chemicals are removed in the first half hour?—Yes.

3433. Practically, might the quantity of water requiring filtration be much reduced?—Yes.

3434. In boiling with alkali do you boil in an engine?—We boil in coppers.

3435. Do you drain the liquid off?—Yes, we run it into a tank and let it settle, and pump it into the engines.

3436. You do not put on a second quantity of water?—Yes, always.

3437. Is that run off?—Yes.

3438. Would not the first water practically remove the greatest part of the soda from the fibre?—Yes.

3439. After that quantity is got rid of from the fibre, is there any very large quantity of soda adhering to the fibre which you put into the engine. I fancy that you make no distinction between the first quantities of liquid you run off; the useless waste liquid and the subsequent washings?—No, they all run into the same.

3440–1. You stated in answer to the chairman that you could not deal with such a large bulk of water. I wish to know whether practically you could not reduce the quantity to be dealt with to the small quantity which one or two washings would make?—Yes.

3442. So that the main bulk of the wash water might go into the river without offence?—Yes, you might have two vents for your washing water; one to take away every noxious part into one channel, and the other to take away that which was not so noxious into another channel.

3443. I suggest this because the burden of the difficulty lies with the large quantity of water.—Yes, of course it does.

3444. What quantities of soda ash do you use per week?—About 3½ tons.

3445. How much bleach?—About a ton.

3446. I believe that the lime from either of the processes, the causticizing of the soda and the waste of the bleach, you keep, and do not throw into the river?—No.

3447. But you did so at one time?—Yes, but not now.

3448. Before your company took the works the paper made there was made from rags, rope, and the ordinary material of paper mills?—Yes; rope chiefly, and bagging, and, of course, rags.

3449. Now you use old papers and Esparto grass?—Yes.

3450. I think you said that the difference in weight between the materials and the paper is about 30 per cent?—Yes, on Esparto it is more; but taking both kinds of materials together, it is about that.

3451. You stated also that 18 tons of paper were made per week?—Yes.

3452. Consequently five tons of material are lost in a week?—Yes.

3453. What is the nature of that?—In our case it consists of the very small fibre of the paper that washes away, and of any material that the paper makers who made it may have put in, such as china clay, or farina, and ink and carbon and other ingredients that ink is composed of; these we call "sink."

3454. The Esparto loses silica, resin, and colouring matter by treatment with alkali?—Yes, and small particles that get washed away of the fibre.

3455. Practically some five tons of material are so lost per week?—Yes.

3456. Which go into the river?—Yes.

3457. (*Chairman.*) Will this process that you are about to try have a tendency to keep any portion of those five tons out of the river?—Yes, by filtration.

3458. The proportion that it will keep out remains to be seen—is a matter of speculation?—Yes, according to the lesser or greater amount of filtration.

3459. Have you any land attached to your mills?—Yes.

3460. Of what area?—About six or seven acres.

3461. Does it lie in such a position that you can readily get upon it this waste from the paper?—Yes, it lies close.

3462. You will utilize it or filter it upon your own land?—Yes; the ponds would be as much for settling as for filtering.

3463. If there is a process of irrigation by which the whole of the offensive matter, solid and in solution, could be taken out of sewage with advantage and benefit, do you think it is not probable that your material, if not actually injurious, might be separated in a similar manner?—It is probable, or at least it is possible.

3464. Would it be worth your while to see any of the processes by which sewage is so purified?—If it was considered that ink or waste from the paper is injurious to the river, it would be worth considering, but I fancy that the only injury that is done to water by paper mills is done by chemicals.

3465. (*Mr. Harrison.*) Is the refuse from preparation of Esparto grass more objectionable, in appearance at least, than that from rags and other materials used in paper making?—In appearance, but not in actual practice.

3466. In preparation of Esparto grass is a larger quantity of soda required than in preparation of superior rags?—Yes, there is.

3467. Do you know of any other means than filtering or subsiding tanks by which this refuse in the preparation of Esparto grass with the soda can be utilized?—Yes, it is in some places evaporated and burned, but that is a process that cannot be followed in this part of the country, because coals are too dear.

3468. What is the price of coals at your mill?—Small coals about 15*s.*, large coals about 19*s.*

3469. There is a mill, Messrs. Cowan's, near Edinburgh, where they have got a patent to burn and evaporate their liquid; they thus get a residuum which is used over again, but coals there cost them only 2*s.* 6*d.* a ton, and they therefore can afford to do it; the pit's mouth is close to their mill. I have a return before me obtained from Messrs. Cowan's agent—

Production, 6¼ cwt. (containing 40 per cent. of soda) at 7*s.* 6*d.* per cwt.		£2 6 10
Deduct expenses, viz.:—		
Coal, 2 tons at 6*s.* 6*d.*	0 13 0	
Labour, 2 men at 2*s.* 4*d.*	0 4 8	
		0 17 8
Daily profit		£1 9 2

That return, if I am not mistaken, comes from their prospectus, which they issue for the sale of their patent.

3470–1. No, I believe that this was taken from their books?—We hear from the trade that it is not paying, and a gentleman who was here the other day from Scotland said that it is the fact, that it only just pays them for coals and labour.

3472. Do you know the mill which adjoins Messrs. Cowan's, near Pennycuik, Messrs Brown's, upon the North Esk, and that they are using it?—No.

3473. They have, I believe, no interest in the patent, and coals would be about the same price?—Yes, but

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I should have thought they would have got coals very much cheaper than 6*s.* 6*d.*

3474. They put coals down at 6*s.* 6*d.* and they show a considerable profit. Are you aware that Mr. Routledge, who introduced the Esparto grass into England, is preparing it in a state of pulp, and sending it out on a large scale from the north of England ?—Yes.

3475. Do you see any difficulty in that system being adopted ?—Very great; at least, we see a loss.

3476. In what way ?—Because we should have to pay Mr. Routledge a profit for doing that part of the labour which we can do ourselves.

3477. Where coal is sufficiently cheap to enable the evaporating process to be carried out with advantage, in all probability the process would be adopted ?—Yes, very possibly in that neighbourhood.

3478. Supposing your system of settling tanks not to turn out successful, what would be the effect in this district of an enactment that this refuse should not be thrown into the river ?—The paper makers would have to turn their mills into flour mills or linseed mills.

3479. The paper mills would have to be located in the neighbourhood of the collieries, where coal was cheap ?—Yes.

3480. That is the case with large cotton manufactories and clothing manufactories in the north of England ?—Yes.

3481. They are located near the coal, and consequently they get the advantage of cheapness ?—Yes.

3482. (*Mr. Way.*) Assuming the statement to be correct that Mr. Harrison read to you just now, the only difference in the case of Messrs. Cowan's and yourself would be the difference in the cost of coal ?—Yes.

3483. Taking coals at 15s. a ton, but otherwise the same data, we should get for the cost—

Coal 2 tons at 15s. - - -	£1 10 0
Labour, the same as in Scotland -	0 4 8
In all -	£1 14 8

which is to be deducted from 2*l.* 6*s.* 10*d.* ?—Yes.

3484. Yielding a daily profit of 12*s.*, would that profit be worth making ?—Of course it would.

3485. Supposing that no profit were obtained, but that the soda recovered paid the expense, do you think it would be very hard to oblige you to adopt such a process ?—If those figures are right it would not be hard, it would be merely giving us more trouble; but I doubt the correctness of the figures very much indeed, and I know that all practical men do, at least most of those with whom I have talked about it, there is no allowance for wear and tear, and the first cost of apparatus is very high.

3486. And no item for royalties ?—No, that statement, in my opinion, is made with an object and it ought to be looked at very suspiciously.

3487. (*Mr. Harrison.*) Is it the fact that another patent has since been taken out for the same purpose? —I am not aware.

3488. Mr. Routledge at Oxford stated so, so that the attention of those interested in paper making must have been directed to that point ?—Yes, there is a paper mill in the neighbourhood of Rochester, called Snodland where they have been burning their refuse liquor. I do not know whether it is under any patent or under Messrs. Cowan's patent, but I presume not. I know that they found the process very costly, and that they gave it up, after having continued it for 12 months.

3489. (*Chairman.*) Did they try the experiment in consequence of proceedings being taken by complaining parties or voluntarily ?—Voluntarily, I believe, to save money, their mill was situated at a rather wide part of the Medway near the mouth of the Thames. I do not think there was any complaint from that neighbourhood about fouling the water.

3490. Do you feel that you are labouring under any sort of hardship, commercially speaking, by reason of the alteration made in the duties on paper with reference to foreigners ?—We do not feel it personally, because we have nothing to do with rags, the dearer they are the better we like it, but I feel very much for others who are engaged in the trade, and if the present state of things continues half of them will be ruined.

3491. The makers of particular classes of paper ? —No, the makers of all paper, particularly rag-made paper.

3492. At the present time you cannot compete successfully with the foreign manufacturer ?—Certainly not.

3493. (*Mr. Harrison.*) In the neighbourhood of Henley are there not many villages and mills that are a considerable distance from railway communication? —The whole of the district between Henley and Marlow is awkwardly situated for railways.

3484. Do you think that the navigation is of much importance to villages so situated ?—I think so; at Great Marlow it must be of very great importance; they have no railway within four miles of them, and they have rather a heavy traffic.

3495. (*Chairman.*) What alteration do you think is required to put English paper makers on equal terms with foreigners ?—There have been many plans suggested, but I should say that the simplest plan would be to prohibit any country from sending its paper here free of duty which places an export duty on rags. If a foreign Government says, "You must pay us an export duty on every hundredweight of rags," we should say "Very well, we will put a duty upon every hundredweight of paper that you send in," but notions with regard to free trade are so various and extended now.

3496. Do you know whether Esparto grass cannot be grown in some parts of America, as well as in Spain?—It is grown in South America and it will grow in certain latitudes; it grows wild as an uncultivated grass in Spain and in northern parts of Africa, Morocco and thereabouts.

3497. (*Mr. Harrison.*) Do you know anything of the use of bamboo in paper making ?—No, but I believe that paper can be made out of anything that has got fibre in it, but because it can be made is no reason that it can be made to pay.

3498. The bamboo is subjected to excessive pressure ?—The process is like that of making paper from wood, great pressure is required to loosen the fibres.

3499. (*Chairman.*) Did you ever visit the great paper-mills in Sweden ?—No.

3500. Did you see them convert pine wood into pulp ?—No.

The witness withdrew.

Mr. C. Stephens.

Mr. Charles Stephens, Chairman of the Waterworks Company, further examined.

3501. *Chairman.*) You have something to add to your evidence ?—Yes. I wish to hand in these papers. (*Printed papers marked* A., B., C., *and* D., *concerning the Reading Waterworks, were handed in.*)

3502. The total number of waterclosets in November 1865, amounted to 1,156, which were supplied by the company ?—Yes. That return was supplied to me by the collector just now.

3503. The charge for one watercloset where the rent is under 40*l.* is 8*s.* and for each additional watercloset 4*s.* ?—Yes.

3504. Where the rent is 40*l.* and under 100*l.* for one watercloset the charge is 10*s.*, and for a second water-closet 5*s.*, and for any additional number 4*s.* each ?—Yes.

3505. Where the rent is above 100*l.* the charge for one watercloset is 12*s.*, for a second water-closet 6*s.*, and for any additional waterclosets 4*s.* each ?—Yes.

3506. And you treat specially for waterclosets for garden purposes, and for trade purposes, where several houses would use the same closet ?—Yes, that proposal has been held out, but I do not know to what

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extent it has been really applied, we are open to any arrangement of that sort.

3507. (*Mr. Harrison.*) You gave us the other day the horse power and the water power that you use, but besides that, I found on visiting the waterworks, that you have erected two 12-horse steam engines for a high-level supply?—We do not reckon them of that power collectively, they are in duplicate, and we work one at a time only; they are used exclusively for supply of the higher services and houses that are situate upon levels that cannot be supplied by gravitation, they supply an elevated tank in the Hamlet of Whitley from which all the houses are supplied. The evidence I gave before was as to the water drawn from its original source, this is part of that water pumped up to a high-level.

3508. Is there any further information that you wish to give the Commission?—I did not say anything regarding the supply of the railways and watering the streets. I think I mentioned that they were supplied from an old source in the middle of the town, in Mill Lane, which has nothing to do with the supply for domestic purposes. We have, by an old Act of Parliament, power to draw water for the purpose of driving machinery to a certain extent on payment of 8*l.* a year to the proprietor of St. Giles' mill. If we were not limited we should have equal powers with a corn mill; but we are limited, and therefore to supply the deficiency of that well we have a small steam machine there; it is entirely for unfiltered water. The waterworks were constructed by Mr. James Simpson.

The witness withdrew.

Mr. Rowland Charles Hurley (of Reading) examined.

Mr. R. C. Hurley.

3509. (*Chairman.*) Are you an inhabitant of Reading?—I am the proprietor of St. Giles's Mill. It is a corn mill in the middle of the town, on the Kennet.

3510. What power is it?—There are 11 pairs of stones.

3511. How much power per pair of stones is required?—Three-horse power.

3512. About 40-horse power altogether?—50, I should say.

3513. Have you dressing and other machines?—Yes.

3514. Do you use steam power?—Yes, occasionally.

3515. To what extent?—16-horse power.

3516. How long have you had that mill?—Five years.

3517. Have you anything to complain of in the water?—Yes, I have to complain of a tanyard above being a great nuisance, twice a week a considerable quantity of stuff comes down so bad that the millers will not stop in the mill.

3518. Of what character is the stuff that comes down?—It almost looks like soap-suds on the top of the water. It comes from the tanyard.

3519. Does it cause a stench in the mill?—Yes, a dreadful stench for an hour or two, and then it passes away.

3520. Have you complained of it to the owner of the tanyard?—No.

3521. Why not, if it has been a nuisance to your men?—The nuisance has been going on for some years, and I believe that it has been often complained of, but nothing has been done.

3522. Are there any houses situated above your mill?—Yes.

3523. Do they drain into the mill head?—Yes, they do.

3524. Have you any complaint to make of the sewage that comes in?—Yes, there is a good deal of smell occasionally from it—in short-water time particularly.

3525. Have you had much nuisance in the last summer?—Yes, there has been a very dreadful nuisance. I cannot very well speak to it, but my foreman of the mill can tell you the whole particulars. Night carts have been emptied into the mill head in the middle of the night.

3526. (*Mr. Harrison.*) Have you any evidence to give as to the floods coming down the Kennet?—We are flooded, the floods come quickly, and they go quickly.

3527. Do you use the navigation at all for mill purposes?—No, I used to do so, but I had such a long time to wait to get goods from London that I gave it up.

3528. Was it from that cause alone, or because of the rates?—The navigation charged me the same as the railway company did.

3529. If the navigation were put into a proper state, would you then recur to the navigation?—Yes, because I would sooner have heavy goods, like wheat, so brought. I could collect them from the ships in the river into my barges, which could go alongside and this would save the expense of lighterage to Brentford.

3530. Is the cost actually greater now by railway?—It is 6*d.* a quarter greater, because there is the collection in London.

3531. Therefore it would be a benefit to you to have the navigation put into proper order?—Yes. I could also send flour in that way from the tail of the mill direct to London.

3532. There is a great deal sent by water, is there not?—Some is so sent, but the greater part of it goes by railway.

3533. Do you think from your own experience that traffic upon the river would be considerably increased if it were put into proper condition?—I hardly know, but I rather think that the railways would compete with the river successfully. There would not be a great increase of river traffic, but there would be some in heavy goods.

3534. Do you think that the railway companies, if they found the traffic going away from them in consequence of the improved condition of the navigation, would reduce their rates?—Yes.

3535. Are you doubtful whether the navigation would be able to stand that?—It would not be able to compete with the railways.

3536. (*Chairman.*) Are there no authorities in Reading to whom you could complain of the nuisances you have mentioned with any chance of success?—Not that I know of. There is the board of health, I suppose.

3537. Could the board of health assist you in the case of the tannery?—I do not know whether they could or not.

3538. Could they assist you in the case of the night-carts being emptied?—Yes, they would do that. I believe it was mentioned, and it was stopped.

3539. You could complain with success of sewage being emptied into the river?—Yes.

3540. But the local board, in order to remedy that, must find some other means of carrying away the sewage?—Yes.

3541. (*Mr. Harrison.*) Are there many houses in your neighbourhood that do not receive their supply of water from the waterworks?—Yes, but where my mill is the people could not use the water any longer, and I was obliged to lay water in at considerable expense; it was impossible to use it.

3542. Are there many houses in the same position?—No, I expect that most of them have their water from the Water Company.

3543. How are the houses on the opposite side of the river Kennet supplied?—I think principally by the company.

3544. Do you know whether any new sewer has been passed into the mill-stream above the head of your mill?—Yes, at low water we can see the sewage coming out of it.

3545. Was that sewer constructed with the authority of the local board?—I do not know.

The witness withdrew.

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Mr. B. Bloomfield.

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Mr. BENJAMIN BLOOMFIELD examined.

3545*a*. (*Chairman.*) You are foreman at Mr. Hurley's mill?—Yes.

3546. How long have you been so?—10 years last June.

3547. Did you hear what Mr. Hurley stated about certain nuisances coming from the tanyards and other sources?—Yes.

3548. Do you suffer any inconveniences from those nuisances?—Yes, from a very great smell arising from the use of the water at the tanyard.

3549. How frequently do those smells arise in the course of a week?—The smells arise more in summer time than in winter.

3550. Is the water continually fouled all the day or at any special times?—For about two hours at a time about twice or three times a week.

3551. Do you know what the cause of it is?—The emptying of the lime pits in which the skins are first steeped.

3552. Do they send into the mill-head the scrapings and dressings of the skins and the refuse hair?—We never see any substance in the water, but only the discolouration of the water—the river comes down as thick as the stuff itself that comes out of the pits.

3553. This stuff causes an offensive smell?—Yes.

3554. Has it made any of your men unwell?—I cannot say that, but when it comes down it causes a tremendous smell in the river.

3555. Does it affect the flour at all?—No, I do not think it does.

3556. You have heard it stated that carts of foul refuse have been tipped into the stream—is that so?—Two or three times I have complained about its having been done during the night, from half-past 11 to 12. I never saw any cart, but we know what has been done by the surface of the water and the smell of the water.

3557. To whom would you complain about it?—We did complain to the police, and they looked into it. I have not smelt it since last July; the police said that they had very nearly made out who put the refuse in, but not quite. It is the tanyard that we complain of most.

3558. Was there an old drain into your mill-head before the new one was constructed?—No, none at all.

3559. Has a new one recently been made?—Yes, up the middle of the road, all the way. I know that Mr. Blandy came to ask Mr. Hurley to draw the water down, so that the drain might be placed low enough, and we did do so.

3560. Is the mill water in any worse condition now than it was 10 years ago?—Yes, the increase of trade has caused an increase, I believe, of the nuisance from the tanyard.

3561. You believe that it is fouler now than it was when you first went there?—Yes.

3562. So foul as to inconvenience you in working your mill?—Yes, it causes a very bad smell.

3563. (*Mr. Harrison.*) For how many days used the mill to be stopped in a year when you first came to it, by floods?—The longest time that I ever knew it stopped was four days. We have not had a flood for the last two years—not to say a bad flood. On Mondays we get very little water to work the mill with.

3564. Can you account for that in any way?—No, the only explanation I can give is that up above they run the water into the meadows on Sunday and shut it in on Monday morning to get a supply, and that causes the water to stop; we have not enough water to work with.

3565. (*Chairman.*) What is the depth of your fall?—Five feet from high water to low water.

3566. What difference would there be in one of these floods that stop you?—The water would rise at the tail about 2 feet or 2 feet 6 inches and we should lose half the fall. We cannot work when the fall is only 2 feet 6 inches.

3567. (*Mr. Harrison.*) Is it not a general complaint upon the Thames, as well as upon the Kennet, that the water is short on Monday morning?—I believe so.

3568. There is no irrigation carried out on the Thames to any extent?—I do not know of any.

3569. Do you not think that the more probable cause is that the millers let the water off on the Sunday and then stop it on the Monday?—That may be so.

3570. (*Chairman.*) What purpose does it serve for the miller to pass it on Sunday?—It is not looked after on Sunday, for they are not working. If anyone saw after the water well it could be kept up to the same head on that day as in working time.

3571. If the miller did not draw his shuttles in some degree, so as to pass the water that he would be otherwise working, it would back up upon him; would not that be so?—Yes.

The witness withdrew.

(*Mr. Exall.*) I wish to observe, that in consequence of drawing the water down so low on Sundays, the sides of the brook are left bare; and the exhalation is almost intolerable sometimes. I know of a case, in which Mr. Stephens, a cooper, was compelled to move from the house in which he lived on this brook from that very circumstance; I am speaking now of one of the tributaries.

3572. Since you have known the river Thames, have you frequently gone in your own barge to and from London?—Once or twice.

3573. Have you upon any of these trips drunk the water of the Thames?—I once took a party down, and we were compelled to take up some water just before we got to Henley. I said that it was very good, because the Londoners drank it—we did drink it, and it made us all ill, except one who did not take it.

3574. How long is that ago?—From six weeks to two months ago.

3575. (*Mr. Harrison.*) To avoid the nuisance you complain of, of the water being lowered, a fixed weir might be placed at the mills?—Yes, that would be a very good practice and useful to all of us on the Holybrook, because the mud that accumulates on the sides is exposed to the sun, and throws out exhalations; the state of things is highly offensive, and I believe very unhealthy.

3576. (*Chairman.*) If the Thames was under a proper conservancy, would it not be the duty of the conservators to dredge these mud banks, and keep the river in a comparatively cleanly state?—Undoubtedly. I should say that just about Reading we are relieved from that difficulty, because Mr. Witherington, who has a mill below and who is a very good miller and a very good man, takes good care to keep a good head always up, so we always have a fine body of water here.

The witness withdrew.

Mr. W. Carter.

Mr. WILLIAM CARTER (of Reading) examined.

3577. (*Mr. Harrison.*) Are you the surveyor of the borough of Reading?—Yes.

3578. How long have you been a surveyor?—Seven years the 5th of next December. I may say that I was a surveyor and builder for 30 years prior to becoming surveyor to the board of health, and I have a thorough knowledge of the town.

3579. What is your salary?—It was 140*l*. a year, then 150*l*., but last Michaelmas it was raised to 200*l*.

3580. Have you any assistance?—No, only what I pay for out of my own private purse.

3581. Of what are your duties supposed to consist?—I have the whole care of everything belonging to the board of health, including of course the drainage.

3582. What length of highways have you under your charge ?—About 32 miles.

3583. Have you any regular system of main sewers in Reading ?—No system ; but the town is partially sewered.

3584. Have you made any sewers since you have come into office ?—Yes, I have from time to time made a number, more perhaps than had ever been made before.

3585. Where are they discharged ?—Chiefly into the Kennet and the Holybrook.

3586. And some adjoining streams ?—Yes.

3587. Are there many cesspools in the town ?—Yes, a great number.

3588. Do you know when they are cleansed ?—Generally of an evening, after 11 o'clock, by men who come round with night carts.

3589. At the instance of the parties themselves ?—Yes.

3590. Have you any superintendence over the process of cleansing ?—The police go round of an evening, and if the parties do not use a disinfecting fluid, the fact is reported to the police station, and then we hear of it. If we find that the parties have so acted, they are taken before the magistrates and fined.

3591. What does it cost to cleanse a cesspool ?—That depends upon the depth ; I should say about 4*l.*, taking an average depth of 25 feet.

3592. How often is it done ?—That depends entirely upon the surface water and the position of the cesspool; the cesspool if it is dug to a proper depth will not require cleansing for a number of years, Reading stands on such a gravelly soil; in fact I have property in Reading myself, where having always taken that precaution I have never known what it is to empty a cesspool. I always carried the cesspool down through the gravel to the chalk and to the springs, and then the sewage liquid percolates through.

3593. It gets away into the soil, and you cannot say what becomes of it ?—No.

3594. Have any parties in Reading wells for supply of water for domestic uses ?—There are some in existence, but not many.

3595. Have you ever heard any complaints of well-water being made bad by cesspools ?—Frequently.

3596. Have persons had to give over using their wells, or to suffer an inconvenience ?—Yes ; where that has been found to be the case, the medical officer or myself have had notice of it. I have gone to the parties myself and seen the landlord of the property, and have induced them to have water laid on ; I have succeeded in that in a great many cases.

3597. Have you constructed many house-drains as surveyor, or is that done by the parties themselves ?—It is done by the private owners, under my supervision. They have to give me notice in writing, and to say for what purpose the drain is; then I take the notice to the mayor, and if it is for surface-water only he signs it, and says, "Go on with the work," and then it is done under my supervision.

3598. Supposing it was for waterclosets ? — That we do not countenance at all.

3599. At the present time there are considerably above 1,000 waterclosets in the town which are supplied with water by the company ?—No doubt of it.

3600. Into what do they drain ?—I believe they chiefly go into cesspools belonging to the houses.

3601. Is there a considerable number that discharge into the drains?—Not many.

3602. Your sewers have not been made to carry away watercloset matter ?—No.

3603. You do not consider them sufficient for that purpose ?—Certainly not.

3604. There are a number of drains that empty into the Kennet at the present time ?—Yes.

3605. And I suppose there are some that empty their contents into the Thames ?—Not one ; they all discharge into the Kennet, and what they call the Holybrook, and other tributary streams.

3606. A great portion of the town of Reading, I assume, lies above the level of the valley of the Thames ?—Yes ; the water about the Thames lock is the lowest point we have ; that is where we take our datum line from, Lock Pool. The level of the Thames there is somewhere about 3 feet lower than that of the Kennet.

3607. Upon what scale is that plan of Reading which is before you drawn ?—Four inches to a mile. It is a copy of a block plan which I have in my office in Reading. I have also made a tabular alphabetical statement of every drain. It has been a work of great labour, and has cost me a great deal of trouble during many years before I became connected with the board. I know nearly all the drains in Reading.

3608. Have you an entire survey of the borough upon that scale ?—Yes.

3609. By whom was it made ?—By Mr. Clacey, who was surveyor to the board of health some years ago.

3610. Did you put in these drains marked here (*pointing to the plan*) ?—Yes ; that one from that point was put in by Mr. Weeble. That is just below the lock, and that is the only one we have below the lock.

3611. Does this sewer (*pointing to the plan*) take sewage ?—It does unfortunately. This property, which was Crown property, 33 years ago was sold, and then sold again, and the parties who bought it have laid it into streets, and have placed in the different sewers you see here.

3612. By whom was this sewer put in (*pointing to the plan*) ?—That was all laid in by private owners, and it goes into the well there (*pointing to a well near Victoria Square*).

3613. You do not know what becomes of the sewage after it gets there ?—No.

3614. There is a system of drains here (*pointing to the plan*) ?—Those were done by the local board of health, to receive the surface water from the road in heavy rains.

3615. Has this well ever overflowed ?—Not to my knowledge.

3616. Is it likely that the town council will take up this question of main sewerage ?—I think so. I think the time has come not only for the town council but for the people living in Reading to adopt a feasible plan.

3617. Is this a public sewer (*pointing to the plan*) ?—No, a private one.

3618. Is this well (*the well for Victoria Square*) ever cleaned out ?—Not to my knowledge ; it is a very deep well.

3619. How many years has it been in operation ?—25 or 26 years.

3620. The whole of the sewage of that neighbourhood has been carried into that well for 25 or 26 years ?—Just that portion which has been recently built. That well was put in by the proprietors of the road (*pointing to the plan*). The houses have a right to run the surface water into that, and, unfortunately, I believe the sewage.

3621. (*Mr. Rogers, through the Chairman.*) Have they connected those drains in Victoria Square with it ?—Yes, and they have a right to do so they say.

3622. (*Professor Way.*) Is it a fact that that is the only well which receives any sewage ?—That is the only sewage well I know of.

3623. (*Mr. Harrison.*) Has there been lately a considerable increase of the houses in the neighbourhood ?—Yes.

3624. The drainage of all these houses (*pointing to the plan*) goes into this cesspool ?—Yes, I have been informed so.

3625. Is this cesspool which is right in the middle of the road private property ?—It was all one property before it was cut up as you see now.

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3626. Is the road private property ?—It is a public road now.

3627. (*Professor Way.*) How many houses drain into that well ?—Perhaps 50 altogether.

3628. (*Mr. Harrison.*) Are there houses by the side of this road (*near the well*) ?—It is all covered with houses.

3629. (*Professor Way.*) Are all those houses in the square supplied with the company's water ?—Yes.

3630. We were told that the supply is at the rate of 10 gallons per head ; is that within your experience ?—About six gallons, I think.

3631. (*Mr. Harrison.*) Have you any experience as to the health of people who live near this cesspool ?—I have never heard of anything breaking out particularly—no epidemic nor any fever—except just by this new cut. There has been a little there in consequence of the fouling of that portion of the river, and the local board of health have had their attention drawn to it by the medical officer, and have remedied it.

3632. How long is that ago ?—Two months ago.

3633. Who is the medical officer of that district ?—Mr. Walford.

3634. As a builder, did you receive materials to any extent by the river ?—No, only timber from Bristol and London, and that not to a large extent ; it generally came by rail, much quicker and cheaper. At present the stone which the board use for their works comes from Yorkshire round by sea to Angerstein Wharf, and thence direct by rail.

3635. If the navigation were put in proper order, would you get heavy goods like that by the river ?—If we could do it on easier terms.

3636. (*Professor Way.*) Is there much breaking of paving-stones by railway ?—No, I never found much inconvenience from that.

3637. You say that that cesspool into which the houses in Victoria Square drain is very seldom emptied ?—I never knew it emptied.

3638. You say that about 50 houses drain into it; would that represent about 200 or 250 people ?—You may take four to five to each house.

3639. That being so there would be something like 2,000 gallons of water at least per day ?—Reckoning 10 gallons per head ; we reckon about six gallons a-head.

3640. Taking it at 1,500 gallons, that quantity must soak away, must it not ?—Yes, the soil is very gravelly.

3641. Are there any wells in the neighbourhood ?—I am not aware. I should not think there are any.

(*Mr. Alderman Darter.*) I know there are in Wellington Place.

3642. (*Mr. Rogers, through the Chairman.*) The whole of this (*pointing to the plan*) is covered with houses considerably below the level of the cesspool, is it not ?

(*Mr. Carter.*) The whole of these houses (*pointing to houses nearer the river than the well*) drain into the river. When my men were cleaning out this part of the river Kennet below Blake's Bridge (*pointing to the plan*) a month ago they were taken very ill from the stench arising from it. The weeds had been growing for many years to the width of 25 and sometimes 40 feet, and all that portion of the river was entirely blocked up. Along this portion by Swain's Wharf there used to be 16 feet of water 40 years ago, and men used to bring barges of 140 tons burthen. Now it is not more than three feet deep, and when we put a punt pole down it went down 12 feet in mud. The blocking up was not altogether from refuse from the gas works, but from Holybrook and the Minster stream carrying refuse from the western part of the town that comes down through Blake's Lock. There was a lock there some time back, and we put a new lock there. That was the cause of this river having grown to the extent it had. It was once merely a ditch.

3643. Under whose orders did your men cleanse the river ?—The medical officer reported upon the state of the river, and I had to report upon it, and the district committee went down with me and told me to do the work. I took away an accumulation in one place 25 feet wide, and in another place 40 feet wide.

3644. What did you do with the refuse ?—I let it float down the stream.

3645. Was your local board of health cognizant of the manner in which you got rid of this refuse ?—No ; they always allow me to do things in the best way I can.

3646. (*Professor Way.*) Were the Commissioners of the river aware of the fact ?—No one ever complained.

(*Mr. John Simonds.*) I complained, for one.

(*Mr. Rogers.*) I never heard of this before.

(*Mr. Carter.*) I might have spent 100*l.* upon the job, but doing it in the way I did I did not spend more than 25*l.*

3647. (*Mr. Harrison.*) What were the instructions given you by the local board of health as to cleansing the river from this accumulation ?—They gave me instructions to commence at the Lock Pool and to go as far as Blake's Bridge.

(*Mr. Rogers.*) There was an order to cleanse it, not to throw it into the Thames.

3648. (*Chairman.*) Do you consider that you fulfilled the order of the board in simply moving it to the width you did ?—They said that I was to go and remove all that would come away. I did so, but the bed of the river remains as it was with 12 feet depth of mud.

3649. (*Professor Way.*) Do the water companies of London ever communicate with you on the subject of the river ?—They never have.

3650. Supposing they had felt aggrieved by that action, to whom would they have applied ?—To the clerk of the board of health, no doubt.

(*Mr. Alderman Darter.*) Rushes and weeds were growing up in this part of the river, and I, as one of the sub-committee, consisting of three, suggested that this stuff, if taken out of the river, would be remunerative, and so I believe now. I did not know that it was sent down the stream.

3651. (*Mr. Harrison.*) The outlet of this sewer (*pointing to the plan*) is just a little below the level of the water ?—A little under water line.

3652. Is there any current along the stream at that point ?—Yes, particularly when they open the gates.

3653. That current is merely caused by the locking of the vessels through the lock. Is that the only water passing along that could remove the refuse ?—When they open the gate of this lock, which they do every Saturday, and sometimes every Wednesday, the water passes to this point (*pointing to the plan*), and drives the refuse out.

3654. Do you know, as a fact, that it does drive it out ?—Yes.

The witness withdrew.

Mr. C. Philbrick.

Mr. CHARLES PHILBRICK examined.

3655. (*Mr. Harrison.*) You carry on the business of a tanner in Reading ?—Yes.

3656. Is your tannery a large one ?—No, not in comparison with many yards.

3657. Do you chiefly tan ox hides ?—We take the slaughter of the locality.

3658. How many hides do you tan a week ?—About 100 hides a week, and about 100 calf skins.

3659. Do you tan any sheep skins ?—No.

3660. What is the material you use in the preparation of the hides ?—Lime and oak bark.

3661. What do you do with the hair that you get from the hides ?—It is sold to plasterers, and for various purposes.

3662. None of it goes into the river ?—No ; we wash it in the river after it is taken off the hides, and take care to secure every particle we can.

3663. What quantity of water do you require for

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that purpose?—About 200 gallons a week would sufficiently cleanse the hair.

3664. Then there would be no difficulty in your removing that into a subsiding tank?—Not the slightest.

3665. And you would not object to do so?—Not at all, but after it is settled the liquid must be emptied somewhere.

3666. The horns, hoofs, and the remainder of the offal are utilized, and go off the premises?—Yes.

3667. What do you do with the lime water in the pits?—That is discharged into the river.

3668. What quantity is that per week?—I should not think it would exceed 1000 gallons a week. It would not be so much as that.

3669. You stated that you could dispose of the 200 gallons which you used for washing the hair by removing it into a subsiding tank, would there be any difficulty in treating the 1000 gallons a week in the same way?—No lime runs off in that. The liquor is allowed to settle in the pits a couple of days, so that what subsides may be used for manure. It is simply the water itself that is discharged into the river, we preserve the sediment for manure.

3670. Do you sell the sediment to farmers?—Yes.

3671. What quantity of lime do you use a week?—About 20 bushels a week.

3672. The refuse subsiding in the tanks would be composed partly of lime and partly of hair?—Yes.

3673. And other animal matter?—No, there is no other animal matter.

3674. What do you do with the scrapings of the hides?—That goes to London for size purposes; it is worth *5l.* a ton.

3675. Do you find any difficulty in getting rid of the sediment left at the bottom of the tanks?—Not at all.

3676. Would you regard it as a hardship if you were compelled to run the 1,000 gallons into subsiding tanks?—Not at all, but the question is how are we to get rid of it eventually.

3677. If the 1,000 gallons which you now discharge into the river were allowed to settle, there would be a considerable subsidence from it, would there not?—No; if any, very trifling; it has always been the custom ever since our yard has been established for the liquid to be discharged into the river.

3678. Has your trade increased considerably within your time?—No.

3679. You do not have hides from a distance, you merely take the hides of Reading and the neighbourhood?—Yes; we have the hides of one slaughterer at Uxbridge. We do not go to the London market for hides.

3680. Are you aware that this refuse which you throw into the river creates a nuisance and is felt to be very objectionable by those residing on the banks of the river below your yard?—We had notice from the clerk to the local board a short time since that it was objected to as a nuisance, but I think that a considerable part of the nuisance, if any, comes from the ironworks above and the drains from the various occupations on the river bank.

3681. What refuse do they throw into the river from the ironworks?—I am not aware of anything beyond gas tar water and the refuse from the dwellings of the workmen.

3682. How many men are employed at the ironworks?—500, I believe.

3683. Can you suggest any means of remedying the nuisance caused by discharging the lime water into the river?—We were advised to empty it into a sewer, but we found no sewer in the town that did not empty itself into the river.

3684. Are you aware what the large tanyards in Bermondsey do with their refuse?—I am under the impression that it is discharged into the public sewer. I do not see that they have any alternative.

3685. Do you send your hides away by the river at all?—No; we sometimes get bark by water.

3686. Should you send them by water if the river were in a proper condition?—Not at all events whilst we have such facilities by railway, because leather is so easily damaged by exposure to wet.

3687. What do you do with the refuse from the tanning process?—A small proportion of it is discharged into the river, but nine-tenths of it goes back again to make fresh liquor.

3688. What quantity do you send into the river?—It would not exceed 500 gallons a day.

3689. That would be tan water?—Yes; there would be very little of the tanning principle left in it, the hides would have absorbed it all.

3690. Has your attention ever been directed to any system of utilizing refuse from tan yards?—No, because there is really no refuse; that which is discharged is simply liquid, for we retain all the sediment that we can. The only plan to adopt beyond what we do now would be to put the liquid into a subsiding tank, and filter it before discharging it into the river.

3691. Do you use steam power?—Yes, for grinding the bark, and pumping liquor from one tank to another.

3692. (*Professor Way.*) I understand you that the lime, of which you use 20 bushels a week, is mixed with water to form what is called milk of lime, and you steep the skins direct in that for the purpose of loosening the hair?—Yes.

3693. You do not let that subside?—No.

3694. When the skin comes out of that the hair is still adhering, but is readily separated?—Yes; some small portions come off into the lime.

3695. I understand you to say that you wash the skins then in the river?—No, the hair is then taken off.

3696. And then the skins are washed in the river?—Yes, and we wash the hair in the river; it is that which is objected to.

3697. Do you wash it in sieves?—In a basket.

3698. Then the lime adhering to the hair goes into the river?—Yes.

3699. And after having been washed the hair retains a certain quantity of lime and is sold to plasterers?—Yes.

3700. The lime in the pits is used over and over again after one set of skins has been taken out for another set of skins?—Yes, three sets of skins will go through each pitful of liquid.

3701. You allow the liquid to subside for a couple of days and then throw it into the river, selling the subsiding lime for manure?—Yes, the quantity of water we should require to discharge after subsidence would be 700 gallons weekly.

3702. That would be 700 gallons for the lime and 200 gallons for washing the hair?—Yes.

3703. You tan 200 skins a week, therefore it is about a gallon per skin?—Yes, for cleansing the hair only.

3704. What is the nature of that liquid after 200 skins have been washed in 200 gallons; is it thick?—No, it is quite thin, like ordinary liquid. That in which the hair has been washed has a milky appearance; whilst that discharged from the lime pit in which the skins have been steeped is of a yellow tinge.

3705. Have you any land in the neighbourhood belonging to yourself besides the yard?—Simply garden ground.

3706. You say you could very readily allow this matter to subside by building tanks, in which case only the portion that was dissolved would pass off?—As it is, each pit lies without any skins for two days, and there is plenty of room for the liquid to settle clear. It pays us to retain all the solid that we can.

3707. With regard to the oak bark, as a matter of course you exhaust that as far as you can?—Yes.

3708. In tanning, is there much matter dissolved out of the skin?—Not any; we think all that is dissolved is in the lime.

3709. And you consider that all the tanning principle is absorbed by the hides?—Yes.

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3710. You use the liquid over and over again, so as not to waste any of the tanning principle?—Yes.

3711. That liquid you think not offensive?—I think not. It has a peculiar smell to which some may object.

3712. (*Mr. Harrison.*) Is the liquid which you pass from your yard into the river clear or coloured?—It is coloured, decidedly. In London, no doubt, they would be glad to get rid of the lime with the liquor, but Reading being in an agricultural neighbourhood, it pays to let the lime subside for manure.

3713. If you pumped all the liquid from your pits into a subsiding tank and left it there for a day or two, and you had a valve 18 inches or more from the bottom of your tank, the upper part of the liquid would flow off almost in a pure condition?—Yes, very nearly so, and in fact we have made a tank for that purpose; we intend trying to filter the liquid through spent bark or charcoal, to see if we cannot turn it in a clear state into the stream; we have just built a tank this week.

3714. (*Professor Way.*) Would it not be possible if you had a little meadow land in the neighbourhood, by the use of a water cart, to dispose of that 900 gallons in the course of a week?—We should have to take it right through the town; a couple of miles, I suppose, from our yard. In its diluted state it would not be worth the expense of carting.

3715. If sewerage were carried out systematically through the town of Reading, would your tan yard be drained?—Yes.

3716. In that case it would come under the same law as that applicable to any other portion of the town?—Yes, I should say so, decidedly.

3717. Tan yards are generally at the side of streams, are they not?—Yes, they consider it a very great advantage to be in immediate connexion with the river. My tan yard has been in existence, I suppose, for 50 or 60 or 80 years.

3718–19. (*Mr. Harrison.*) Do you use the water from the river?—Yes.

The witness withdrew.

Mr. T. Woodley.

Mr. Thomas Woodley examined.

3720. (*Mr. Harrison.*) I believe you occupy some land on the river Kennet?—Yes.

3721. Of what extent?—About 40 acres of meadow land.

3722. How far above the town?—About a quarter of a mile.

3723. How many years have you occupied that land?—I and my father, I suppose, 40 years.

3724. Is it more subject to floods now than it was some years ago?—Not so much. The reason is this. A culvert 4 feet 6 in. in the clear was put in by the Kennet and Avon Company, which has the effect of taking the water off more rapidly.

3725. Is your land drained by pipe draining?—No, it does not require it.

3726. Is the subsoil gravel?—No, peaty.

3727. What is the level of the land in relation to the river?—About 2 feet 6 in. above the river Kennet when the river is to its regular high-water mark.

3728. What effect has flood upon the adjoining meadows?—If it could be got to run off quickly there would not be any damage, but where it lies a considerable time it is injurious.

3729. How many days do you consider it might lie on a meadow without doing injury?—Three or four days.

3730. How many days do you consider would hurt the meadow?—Perhaps 10 days; the effect would be to bring up a rushy bottom.

3731. Your meadow is scarcely affected by floods?—Only by high floods, but before we put the culvert in I have known the water never off for 10 weeks.

3732. What was the effect of that?—We get better crops than we used.

3733. Are you subject to summer floods?—No.

3734. Are they in the upper part of the Kennet?—Yes; the least rain in the upper part of the Kennet will send the water over perhaps some acres of land; that is on account of there being no drain. If this drain that I am speaking of was continued up to Small Meads the people there would get the water off their land as quick as we off ours. The moment the water gets into the Kennet this culvert takes it off.

3735. Would there be any difficulty in carrying the culvert as you suggest?—Not the least; it would have to go under the Kennet to the opposite side of the river.

3736. Would there be any objection on the part of the owners of the land adjoining?—Mr. Monck, no doubt, would object to it.

3737. At what height below the level of the land adjoining is it most beneficial for the water to be?—I like the water to be 2 feet under the level of the land. If higher than that I think there would be a certain dampness and coldness at night that would cause the grass not to grow so quickly, and make a sedgy bottom; there would not be the same quality in the grass; and then of course the land would be subject to flood more quickly.

3738. Have you observed the floods in the Kennet now as compared to years gone by?—For two years we have had very dry seasons. I do not think we get a very high flood once in 10 or 15 years. The highest flood on the Thames was in the year the Duke of Wellington was buried, but it did not affect me on the Kennet. We had a low flood, considering what there was on the Thames.

3739. Does the flood come down more rapidly upon the Kennet than it used to do?—No, I think not. The stream is so full of weeds that the water cannot come down. I do not think it runs off so quickly at Small Mead as it used to do. On account of the weeds, and the mud which accumulates round the weeds, there is not the free passage for the water that there was some years ago when there was more traffic on the canal by boats.

3740. The Kennet and Avon is in the hands of the Great Western Company?—Yes.

3741. They do remove the weeds occasionally, do they not?—Yes, I think they have done it once this summer.

3742. But not thoroughly?—No.

3743. Do you know the drainage that has been carried out by Mr. Benyon?—I have heard of it and have heard that it causes more water to flow down, but we have not experienced any effect on our meadows. If a high flood had come quickly we should have had more of it, but I have not found any difference. The water flows to Small Mead quicker, but not to affect me.

3744. Why would it not effect you as well?—We have not had a great enough flood for that.

3745. You are only affected when it is a very high flood?—That is all.

3746. Do you carry on any other business besides that of a farmer?—No. I have had to do with drainage works. 25 years ago I was the local surveyor appointed by the parish of St. Giles's, and since then I have had a good deal to do with contracts for drainage of the town. I had to do with the cleaning out of Holybrook, which goes under the town.

3747. By whom were you employed?—By Mr. Buncombe, the owner of Abbey mill.

3748. That is private property?—Yes. We get out every year perhaps 100 or 120 loads of stuff, night soil and so on. This brook runs underneath many of the houses, in Minster Street for instance in the centre of the town; and of course a great many of the common sewers come in, and waterclosets from those houses. That refuse accumulates; and if they did not clean the stream out they would not get water at the mill. The stream has gone sometimes as long as two years without being cleaned out.

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3749. Is the greater part of what you get out sewage matter?—A great deal of it is coarse broken crockery ware. We find generally most matter by the mill, it always stops there and smells very offensive. It is obliged to be thrown out under the bridge here and carted away.

3750. (*Professor Way.*) Holybrook is used, to a great extent, as a public sewer?—It is a sewer for the property adjoining.

3751. You said that it runs under houses, do you mean under the yards of the houses?—No, many houses are built over it.

3752. They drain directly into it?—Yes, and most of them that do not, have waterclosets over the brook.

3753. Do you know of any land in the neighbourhood of Reading that could be made available for taking sewage?—Every one would be glad to take it. I have tried it myself on a small scale, and found it to be very beneficial.

3754. (*Mr. Harrison.*) Going up the Kennet between here and and the paper mills the land appears to be water-logged and growing rushes. Do you know what effect that condition of land has upon the health of people residing in that neighbourhood?—No, I do not, but I have 30 or 40 houses in what we call our low lands close to the Kennet, and we find the health of the people residing there is generally very good; that is a low place.

3755. But that is well drained?—Yes.

The witness withdrew.

Mr. William Hodges examined.

Mr. W. Hodges.

3756. (*Mr. Harrison.*) What is your occupation?—I am an auctioneer at Reading.

3757. Have you any information to give the Commissioners upon the subject of their inquiry?—Between 30 and 40 years ago a gentleman of the name of Thomas Ward, the son of Alderman Ward of this town, laid out a very large sum of money, 10,000*l.*, in removing the night soil of this town to a place called Easthampstead, 10 miles off. He purchased a tract of land for the purpose of bringing the land into cultivation.

3758. What was the character of the land?—It was very poor land, something like that about Chobham.

3759. What was the sub-soil?—Sand. He was a surgeon, a man of considerable information and judgment, but he had not sufficient funds to go on with the scheme, and it failed, but the land now is in a state of cultivation. He provided small night carts and employed men to remove the soil from time to time. As a native of the town I have often thought what an advantageous thing it would be, seeing that there are so many acres of land available within so short a distance of Reading, if funds could be raised for the purpose of purchasing land to put the sewage upon, instead of turning it into the tributaries of the Thames or into the Thames itself. No doubt in a very few years, looking at the state of the town and some of the streams which were formerly perfectly pure, but which are becoming more and more polluted every day, and which communicate with the Thames, the Thames in a few years will be in as bad a state in the upper part of it as the part in London was a few years ago.

The witness withdrew.

Mr. Francis Arthur Bulley examined.

Mr. F. A. Bulley.

3760. (*Mr. Harrison*) Are you a surgeon living in Reading?—Yes.

3761. Have you been in practice there for a great number of years?—Yes.

3762. We have had it in evidence before this Commission that the system of drainage in the town of Reading is chiefly by means of cesspools?—Principally. No doubt there are other means by which a great deal of the sewage flows into the Kennet.

3763. Have you observed at any time ill health which you could attribute to those cesspools?—Only a few days since I was attending a patient with fever in a house in Welldale Street; the whole family have been affected with fever of a low type, and the mother of the children who had the fever tells me she has no doubt it originated from some bad smells arising from a cesspool in the garden. I desired her to make a complaint to the superintendent of police, and he has caused it to be emptied by having a hole broken through the wall at the back, and so removing the contents without taking them through the house.

3764. To whom does that cesspool belong?—The person who lives there is a person of the name of Hale, an inspector on the railway. I have no doubt in my own mind that in that case the cesspool was the origin of the fever.

3765. Have you, in your practice, observed fever to be frequently occasioned by cesspools?—No, I have not found it very often.

3766. Have you observed the condition of the Kennet year by year during your practice here?—Yes, I have noticed it particularly; there is a space which is quite a *cul de sac* before you reach the pound on the Kennet in which I have observed an immense quantity of human ordure resting there for days together. Now that the navigation of the river is very much diminished in consequence of the railway, of course the gates are not opened so often as they used to be, and the water does not flow through there. I have often noticed what I have described for days together; year after year it has been the case, and I believe it is so now.

3767. Can you attribute illness in any part of the town of Reading to that condition of things in the Kennet?—That part has only recently been built over, and the other part of the town has not been near enough to the source of infection, if there were infection.

3768. You only state the nuisance; you do not know any result from it?—No.

3769. (*Chairman.*) Are you acquainted with the river Thames by boating upon it?—Two or three years ago I was frequently on it.

3770. Have you ever found any nuisances floating upon the Thames, such as dead dogs?—A great many dead dogs always, especially in the upper part of it, towards Purley.

3771. It does not appear to be any person's duty to remove them?—No, they appear to remain there as long as they hold together. I have never seen any one attempt to remove them. I have frequently seen them, and a most disgusting sight they are after a time.

3772. Do you think the Thames is better or worse than it was for boating?—I should think it was worse; the flow of the water is interfered with very much by weeds.

3773. Weeds grow ranker than they did?—Yes, there appears to be a new sort of weed choking up the river, the American weed.

3774. Does it grow very much about Reading?—Yes, it seems to take possession of all the water about here.

3775. Is there anything which you wish to add relative to the subject of our inquiry?—I think, with regard to the flow of the water in the Thames being impeded, it would be as well if you could inspect certain portions of the river, because they appear to me to be completely choked up by weeds, not by this American weed alone, but by the common weed of the river; in fact one part of the river at times is almost unnavigable to a common rowing boat; you cannot get over the weeds.

3776. Is it worse than it was formerly?—Very much indeed; it gives the river the appearance of having become almost useless for navigation.

The witness withdrew.

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Mr. CHARLES AYRES examined.

3777. (*Chairman.*) You are a coal merchant residing in Reading?—Yes, I have been in business myself these 25 years, and in the town all my lifetime.

3778. How long is it since the railway companies have established themselves here?—The Great Western railway has been established 22 years about.

3779. Did you ever carry coals by water?—Yes.

3780. Do you carry as many now?—No, nor yet a tenth part.

3781. Do you prefer to carry by railway in consequence of the reduced rates on the railway, or in consequence of the defective state of the navigation?—More particularly on account of the reduced rates on the railway.

3782. What would the railway deliver coal at per ton from London?—They are delivered from the northern collieries direct here.

3783. (*Mr. Harrison.*) Is there any coal at present brought by the Oxford canal down the Thames to Reading?—Very little.

3784. Do you know the charge?—I know what it used to be when we had our boats running; the tolls alone were something like 3*s.* 6*d.* or 3*s.* 9*d.* a ton, leaving alone the expense of the labour in working the barge down, which made the total something about 5*s.* at that time. I do not know what it is now. Coal from Oxford to Reading was driven off the Thames on to the line on account of the railway being cheaper. I think there would be very great difficulty in getting that trade back again even if the traders were shown that by the river they would have equally advantageous terms, because their staff has been broken up which they used to have for carriage on the river, and they would not be inclined to alter their existing arrangements.

3785. What is the price of coal now in Reading as compared to what it was before the railway was opened?—3*s.* or 4*s.* a ton cheaper or thereabouts.

3786. How was Reading supplied in former times before the railway was made?—From Derbyshire, Staffordshire, and Somersetshire.

3787. Was much coal brought from London?—Never a large amount from London, because that coal was too dear as compared with other coals.

3788. Then Reading is still supplied chiefly from the same sources as before?—From the same sources, and also from the Forest of Dean and North Wales.

3789. You get more from the midland counties than you did, and not so much from Somersetshire?—Just so; three parts of the coal trade at that time was from Somersetshire.

3790. Was that brought by the Kennet and Avon?—Yes.

3791. Is there much brought by the Kennet and Avon now?—No, very little.

3792. Do you know the price of it?—It will come cheaper by rail. I have a pair of boats tied up now which I do not work, because coal comes cheaper by rail.

3793. Is the Kennet and Avon in pretty good order?—Yes, as good as it has been for many years past.

3794. There is no difficulty upon it from the condition of the navigation?—No, only the short supply of water which of course it is liable to; nothing in the way of defect in keeping up repairs and so on.

3795. What is the total quantity of coal brought to Reading?—60,000 to 70,000 tons a year. Reading supplies a large neighbourhood besides itself.

The witness withdrew.

Mr. T. L. Walford.

Mr. TIMOTHY LARKIN WALFORD examined.

3796. (*Mr. Harrison.*) You are medical officer to the guardians?—I am. I have been for many years medical officer for one of the districts of the union, but just now I am what they call medical officer for the whole district of Reading Union, appointed in consequence of the threatened approach of cholera.

3797. Have you had occasion to point out to the guardians the existence of any nuisances that have been detrimental to the inhabitants of Reading?—In a great many instances.

3798. Could you specify some?—In visiting various courts of the town, which the note from the clerk, announcing my appointment, told me it would be my special duty to do, I have had to complain of the state of the surface drainage, there being no proper escape for the rainfall without saturating the soil. I have had to complain frequently of privies being full and not constructed with a stench pipe, so that gases were continually escaping. In many cases I have had to complain of defective water supply, and in many also of houses being exceedingly badly constructed for health.

3799. (*Chairman.*) Have you any typhus or typhoid fever prevailing at present?—We have had during the summer a great deal of typhoid fever.

3800. In what parts of the town?—In the lowest parts.

3801. Is it within your knowledge that the relieving officers of the union have to give relief to the poor in those places when they are afflicted with typhoid fever or typhus?—In many cases they do, but of course the class may be such as not to require relief.

3802. Do any of the people take their water for domestic purposes from the river?—Yes.

3803. Do you know whether there have been any ill effects from that cause?—I do not.

3804. Has your attention been drawn to the condition of the Kennet?—It has; the Kennet, especially below Blake's Bridge, has been through neglect allowed to be encroached upon to a very great extent, so that, as the surveyor told me, 30 or 40 feet had been reclaimed for the stream by removal of weeds and rubbish which the weeds had caused to accumulate. That part of the Kennet has been recently greatly affected; filth from pig-styes on its banks, and also matter that has been taken to those pig-styes for food, but allowed to remain long enough to become decomposed, have, with the surface water after rain, found their way and trickled down into the Kennet; the smell of this liquid manure, as you might call it, could be perceived at a considerable distance, and you could see the course of it running directly into the Kennet.

3805. Have you during your ordinary rounds ever come in contact with the nightmen when they have been emptying cesspools at night in any parts of the town?—I have.

3806. What sort of effect has it had upon you?—I cannot say I have myself found any inconvenience from it. I have never passed the place where the night cart has been at work, without making it my business to stop and examine whether there was anything particularly offensive going on, and whether they were using the proper quantity of deodorizing fluids, so as not to create a nuisance.

3807. (*Mr. Harrison.*) Have you found any sickness which you could attribute to the condition of the Kennet?—I cannot say that I have. The great evil with respect to those houses near the Kennet is the low level on which they are built, and consequently their imperfect drainage. It is on that account that the houses on the banks of the Kennet are more frequently the seat of epidemic diseases in their worst forms than others; they not only occupy a low level, but in many cases there is no surface drainage, and they are supplied with water from a pump; and as I said before, the houses are badly constructed, so that there is no thorough draught through them; the consequence of which is that health is undermined and the

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inhabitants are in that state that they easily take any disease which happens to be prevailing.

3808. Was that the purport of your report to the board of guardians upon which they called upon the local board of health to have the stream cleared?—That was used as the argument before them in order to get the stream cleared, and to get rid of those nuisances. It was urged, that inasmuch as the Kennet is fouled to a very great extent in its course through the town, they should get the gate at the back of Messrs. Huntley's premises and also the lock raised once a week; the river charged with a good deal of foul matter might then pass more quickly along and get out of the reach of the inhabitants.

3809. Action, to a certain extent, was taken by the local board in consequence of that?—Yes, they have cleared the stream and have arranged that the gate of the weir and the lock shall be raised once or twice a week, so that at any rate the whole body of water may be changed.

3810. (*Chairman.*) Do you think that the corporation of Reading might if they choose improve the condition of the town by sewering and draining?—There is no doubt about it.

3811. And by that means might remove some forms of disease which exist in the lowest parts of the town, such as typhus and typhoid fever, or reduce them?—Yes, reduce them, lessen their fatality. My experience as a medical man shows me that good drainage, good water supply, and properly built houses, are essential to health, and just in proportion as those laws are violated will people suffer.

3812. Your experience of the town of Reading is not a good example of those principles being carried out?—No, we have a very fair water supply, but we have no real sewerage.

The witness withdrew.

Adjourned till Tuesday, November 28, 1865.

Town Hall, Windsor, Tuesday, 28th November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

JOHN JONES, Esq., (of Windsor,) examined.

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3813. (*Chairman.*) You are mayor of Windsor?—Yes.

3814. How long have you known the borough of Windsor?—Above 26 years. I have been engaged as a coal merchant for the last 13 years in Windsor.

3815. Did you ever use the Thames for navigation purposes?—I use it now occasionally to bring up coals in barges. I use both the railway and the barges; myself and partner have a wharf at Eton.

3816. Where do the barges bring the coals from?—From the pool in London. There are very few barges, we chiefly have coals by railway.

3817. What would those barges carry?—We hire the barges, we do not keep our own, and their tonnage would be about 63 tons.

3818. What length of time does it take to get a barge from London to Windsor?—That depends upon the state of tide and the lowness of water.

3819. Would it be a day or two or a week?—I think that two or three days would be enough to bring a barge to Windsor.

3820. Do the barges ground occasionally upon shoals in the river and lose time?—They have been occasionally detained in consequence of the lowness of the river.

3821. Is the condition of the river worse now or better than when you first knew it?—Considerably worse.

3822. Are you one of the Thames Commissioners?—I am.

3823. Are you a member of the general body or a member of any of the committees?—I am a member of the general body.

3824. Being a Commissioner, have you attended any of their meetings?—Never but once, and that was when I was mayor, six years ago. It was the annual meeting, and I then took the chair, which it is customary for the mayor to do.

3825. Is the town of Windsor sewered?—We have spent a great deal of money upon sewering in the last few years, some thousands.

3826. Is Eton sewered?—Yes.

3827. Are there many water-closets in Windsor?—A great many.

3828. In hotels and better classes of houses are they general?—Yes, I think so.

3829. Are there cesspools still in use in Windsor?—Yes, certainly, several.

3830. They have not been all abolished yet?—No.

3831. If the navigation were improved between Windsor and London, would that operate as an inducement to bring traffic upon the river?—I think it would.

3832. If you could get barges up with more regularity there would be an increase of traffic?—Quite so.

3833. Do steam barges come up from London to Windsor?—There used to be one or two, and there is one now that goes to Reading, but only occasionally.

3834. Are there no steam barges that come to Windsor?—No.

3835. Do many pleasure boats come from London to Windsor?—A great many.

3836. Navigating the river the whole way?—Yes, and to Oxford, and backwards and forwards.

3837. Are there mills using water-power near Windsor?—Clewer mill and Tangier mill.

3838. Do the barracks drain into your sewer?—Yes, they do.

3839. Then the refuse of the castle and the barracks and the town of Windsor passing into the sewer is discharged into the Thames?—Yes, at Swan's Bridge or Albert Bridge.

3840. Without any deposit having been taken from it, or any form of disinfection being used?—Yes.

3841. Have any complaints been made as to the fouling of the river?—No, beyond this, that Mr. Menzies made an application to us about some scheme to be carried out.

3842. Has Windsor a good supply of water?—Yes, a very good one. It is supplied by a private individual, Mr. Cutler.

3843. Where is the water obtained?—From the Thames at Tangier mill, at Eton.

3844. (*Mr. Harrison.*) What is the cost of carriage by railway and by river?—By railway it is about 4*s.*, and by barges about 4*s.* 6*d.*

3845. Does the 4*s.* include all charges?—Yes, wharfages and everything, from Nine Elms Station to Windsor.

3846. If the cost by river were reduced, could the navigation compete with the railway?—Yes; in fact it is worth a shilling more to have coals brought

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by the Thames than by railway, on account of the absence of breakages.

3847. If you could get coals now by river, paying 6*d.* a ton more than by the railway, you would prefer them by river ?—Certainly.

3848. Is the reason why you do not so get them that you cannot get them ?—We can, if we like; but our principal business and our stowage places are on this side of the river, and we prefer to have them there to taking them on to the other side of the river, where we have a wharf.

3849. Could you not obtain the same accommodation on the Windsor side ?—Not for loaded barges; the railway company would not allow that. We should have to put them on to the railway premises.

3850. You are not obliged to have premises of your own, are you ?—We should be if we brought barges to this side of the river.

3851. What difference does it make per ton in a year, having them brought on to the railway premises ?—6*d.* per ton.

3852. Should you be opposed to the substitution of the Conservancy Board for the future management of the Thames ?—Not at all. I think the time is come for something to be done, and that matters cannot go on for many years in the way in which they are now.

3853. (*Chairman.*) Should you object to any legislation that would deprive you of your commissionership ?—Not at all.

The witness withdrew.

Mr. H. Darvill.

Mr. HENRY DARVILL (of Windsor) examined.

3854. (*Chairman.*) You are town clerk of Windsor ?—Yes.

3855. How long have you been town clerk ?—About 13 years.

3856. Are there estates belonging to Windsor corporation ?—Yes, they have property in the river Thames.

3857. Has it any lock dues or fishery rights ?—Fishery rights.

3858. Does it exercise those rights or lease them ?—It leases them.

3859. What is their extent ?—They extend about three-quarters of a mile, from a place called "Becks-cross," near the Clump at Eton, down at a place called the "New Works," at Eton College, which includes the weir.

3860. Does the corporation own both sides of the river ?—Yes.

3861. What rights of fishery do they exercise ?—The public may angle, but the corporation in their own waters have an exclusive right of netting.

3862. Have you, or your tenants, power to draw down the water at the weirs or locks for fishing purposes ?—No.

3863. Are you a Commissioner ?—I am one of the committee of three for this district.

3864. How frequently do you meet for the transaction of business ?—We meet several times in the course of the year, at various places—at Oxford, Abingdon, Wallingford, and at Windsor. The distances we have to travel are very considerable, and the mode in which we meet is inconvenient.

3865. Do you receive any allowance for travelling expenses ?—Yes, but it is very moderate, just paying our railway fares.

3866. Is it 6*d.* a mile ?—No, it does not come to that, but the committee used to receive that.

3867. Do you receive any allowance ?—Yes, for expenses out of pocket.

3868. When did the committee last meet ?—There was a meeting the other day at Wallingford, but I did not go.

3869. What form of business is usually transacted ?—They transact all the business relating to the navigation. The chief business is really to endeavour to maintain the works.

3870. You receive reports, I suppose, from the engineer ?—Yes, from our general surveyor.

3871. And from the secretary ?—Yes, from the general clerk.

3872. Have you funds sufficient to meet the demands made upon you ?—No; we have been in this position: the funds were originally 15,000*l.* a year; but when the railway was introduced traffic was removed from the river, and the income gradually fell off; it is now reduced from 15,000*l.* to about 3,000*l.* It is insufficient to meet our current expenses. We cannot pay the bonded creditors one farthing; and I was the person who moved that we should expend no more money on the Thames until we had money in hand, because we took counsel's opinion, which was to this effect, that if we contracted any liabilities we should be personally liable.

3873. How long is it since you obtained that opinion ?—About nine months since, when I was at Oxford.

3874. In the event of one of the locks or weirs coming down, what would be the consequence ?—It would probably destroy the navigation in that district.

3875. And you as one of the committee of the Commissioners would not feel justified in ordering an expenditure to replace it ?—Certainly not.

3876. Not having sufficient funds in hand ?—Yes, and not being ready to incur a personal responsibility.

3877. Supposing that a great mischief accrued to the country by reason of one of these locks having bodily given way, is there anybody to whom you could turn in such a dilemma ?—Under our Acts of Parliament we could turn round upon no one—our only means of revenue is by levying tolls. We cannot pay interest, and we cannot now borrow.

3878. Are you acquainted with the Acts of Parliament under which the Commissioners act ?—I am generally, but they are very loosely and badly drawn, they do not give the Commissioners sufficient power. I consider that the clauses in the Acts are most incongruous.

3879. If anything is to be done to restore the navigation, would it be necessary to consolidate the existing Acts ?—I would repeal the whole of them, and re-enact, that is the only way, for they are the worst drawn Acts that ever existed. I should say sweep them away.

3880. Do you think that the navigation, if re-established, might be made self-supporting ?—I believe that the river might be made self-supporting. I think that it is a much greater convenience to persons wanting heavy goods to have them carried by water, when time is not an object. For example, coals; the barge goes down into the pool, and is filled from the collier immediately, then it comes from the pool up with the tide to Teddington lock, and is towed from there up the river; there is thus only one shifting; whereas, if carried by railway, the coal must be taken in the first instance from the pool to the railway, and then again from the railway to be put into trucks, and then finally unloaded at the railway station; it would in fact have to be shifted three times.

3881. You think it is practicable to put the river Thames into such order as to offer a reasonable chance of a remunerative income from the money expended, if the bonded debt could be disposed of ?—Yes, if the debt could be satisfactorily compounded and paid off. That I believe could be done for about 5*s.* in the pound; there are about 90,000*l.* due, and I know that the bondholders would be very glad to fall into such an offer as that. Of course, in any legislation that might take place, the bondholders would be heard before Parliament and would make out the best case they could. I apprehend they would be pretty much in the same position as persons who have lent money on a turnpike road the tolls upon which have fallen off, for after all the Thames is only a public highway.

3882. Do you think it possible to put the present commission into manageable working order for the future maintenance of the river Thames?—The constitution of the present body is cumbersome, and another body might be constituted to work that navigation, whether the Thames Conservancy or some other. I thought at one time that the charges for the maintenance of the navigation ought to be thrown upon the counties through which the Thames runs as a great public highway, and as a great sewer in fact—a great watercourse giving drainage from Gloucestershire to London. But I believe that such a proposal as that would meet with great opposition from the justices in quarter sessions.

3883. Who are *ex-officio* members of this commission?—Yes, if they live within a certain distance of the river.

3884. Why should they offer any opposition?—Because if a contribution was to be made out of the county rate, those persons in the county who live at a considerable distance from the river would naturally object to contribute towards the maintenance of a highway that they never used. Those who live near would say, Certainly we will contribute to keep the river up.

3885. The riparian proprietors would be willing to tax the county?—Yes, very willing, but the inhabitants of the county who lived at a distance would not be willing to pay.

3886. Do you know the river Thames from having been upon it?—Yes.

3887. Above and below Windsor?—Yes.

3888. Is it much used for boating or pleasure purposes?—Yes, more in that way than for carriage of merchandise.

3889. Are the facilities sufficient at the present time for its being used for pleasure purposes?—The locks might be better constructed for those purposes. One of the great defects in the navigation is the construction of weirs and locks with timber and iron. The action of water and air alternately upon timber causes it to decay; whereas if the locks had been built, when the Thames Navigation Commissioners were in a state of prosperity, of a more substantial character, with brick and granite, well faced, I believe the navigation would have been maintained more cheaply. It is an extravagant mode in the end to construct locks too cheaply in the first instance.

3890. The expenditure required for the maintenance of the navigation you think is very much greater than it need be?—Yes; that is, if the first cost had been greater, the expense of maintenance would have been infinitely less.

3891. Is land adjoining the river here subject to flooding?—Yes, I have known very extensive floods, and miles of country under water. I have known the floods in such a state that in Eton the people were going about in boats.

3892. I need hardly ask you whether that is a state of things which it is advisable, if possible, to improve?—Certainly; but I do not believe that you could increase the sectional area of the river so as to carry away a larger body of water than now. I do not think that any alteration in the navigation would materially affect the floods.

3893. Might marginal banks be placed on flooded lands so as to prevent the flood waters getting over?—Yes; if you raised the banks you could keep the Thames as you could any river way, within a certain channel, but it would be at an enormous cost.

3894. Would the cost be greater than the benefit done to the land?—The landowners would not like to pay the charge for a bank; that would be very costly, although I believe it would be for the benefit of many of them. Some would be benefited, and some would not. The floods rather do good to some lands.

3895. I suppose that depends entirely upon the period of the year when the floods get over them?—Yes, the floods generally go over in the early part of the year, at the breaking up of the frost, but I have known them in the middle of the year. When there has been a heavy fall of snow, and a large fall of rain with it, then the amount of the water is more than the river can carry away. Then come the floods and the lands are submerged.

3896. (*Mr. Harrison.*) You carried out, I believe, a scheme of main sewerage that was devised by Mr. John Rowe?—Yes.

3897. (*Professor Way.*) Is it so designed that it runs, as it were, upon the line of a bow?—It does, and water is passed through to flush it. It discharges a large quantity of sedimental matter, but I believe that it could all be collected and filtrated, and the valuable portions preserved for manure, the pure water flowing away. I believe it is perfectly possible to do that.

3898. (*Chairman.*) What is the population of Windsor?—About 10,500.

3899. Does that include the population of the castle and of the barracks?—It includes the castle population, but not, I think, the population of the barracks.

3900. The population of Windsor itself may be taken perhaps at 8,000?—Yes.

3901. What would the population of the suburbs be from which sewage might pass into the river?—About 3,000 or 4,000.

3902. Then I suppose we may take the whole population at about 20,000 in round numbers?—I should think about 15,000.

3903. Do many visitors come to Windsor in the summer season?—A great many; they either go into lodgings or to an hotel. Windsor itself is not badly drained. The Spittal district is not drained, but I think it ought to be.

3904. Are there cesspools in that district?—I believe there are.

3905. The castle, I suppose, is sewered?—Yes, it drains into our main outfall.

3906. And that passes through the Great Park down into the Thames?—Yes.

(*Mr. Menzies.*) The castle drainage is now cut off and the sewage passes into the Thames direct.

3907. (*Chairman, to the witness.*) What form do you think any future commission should take for the proper management of the Thames?—I know that the House of Commons Committee has reported in favor of the Thames Conservancy, and of course when a body like that, after hearing the evidence, has come to a conclusion, it is a difficult thing to advocate any measure that might be opposed to it. I think, however, that if there was a Board constructed of gentlemen selected from each of the counties through which the Thames flows, and the bondholders were compounded with, and we had power to levy as against the counties a rate not exceeding a given sum, we might borrow money upon those rates so as to get capital enough to put the works in order and improve the whole navigation. I think that the debt might be repaid out of the annual income. I believe that the annual income from the Thames might be greatly increased if there was a system of steam tugs upon the river, and that a large proportion of the heavy traffic that comes by railway might come by the Thames again. I am satisfied that the trade would prefer water to railway carriage when it was not a matter of time. In flood times you cannot navigate the Thames because the towing-paths are all under water and the horses would be washed away. In summer occasionally the river is so dry in the shallows that the barges are left aground; but I think it is quite clear that if there were steam tugs they would not mind the flood; and if there were some expenditure of money the shallows might be altered and all difficulty from that source also would be removed, so that both in winter and summer barges

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might be towed up the river, and I believe the navigation would then pay.

3908. At the present time I understand that the river washes away the bank on one side and builds up eyotts, or islands, or swamps on the opposite side, so that the riparian proprietor on one side loses his land and the proprietor on the other side gains land, and increases it by planting osier beds ?—Yes, I know a great deal about that; I am a proprietor on the river myself, and we both give and take. I rob my neighbour and my neighbour robs me, and it arises from this circumstance—the river Thames is very circuitous in its route, the water comes down rapidly and impinges upon a particular part of the bank, that bank is gradually washed away and undermined and falls in, the earth is carried away, and deposits itself in quiet water; wherever the water is quiet there is a sedimental deposit.

3909. Do you know how the boundary line runs, where the Thames happens to be the boundary of parishes, or counties, or townships, is it the centre of the river or one of the two banks ?—It varies; sometimes it is the middle of the river, sometimes one bank and sometimes the other. I know that some parishes go across the river and then come back again. Windsor parish, which is in Berkshire, extends also across into Buckinghamshire.

3910. Is that in consequence of the boundary having originally been the centre of the river, which has since altered its course ?—No; I think that the whole bed of the river was originally in the parish of Windsor, it was granted to us by one of our charters as being the property of the Crown.

3911. Where the centre line of the river is supposed to be the boundary, and this shifting takes place that we have been speaking about, is there any authority to settle the boundary between any two townships or parishes or properties, if it became a matter of dispute ?—No, inasmuch as a case such as you suggest could only be brought into existence after a long period of years, it does not make a sudden impression, and therefore the thing gets adjusted by progress of time.

3912. There is no recognized authority before whom such a dispute could be settled, or a boundary be defined ?—No.

3913. If any new commission were to be appointed to deal with these matters, it would lead perhaps to the permanent improvement of the banks of the river, so as to prevent their wasting away by the encroachment of floods; and in the event of the banks being washed away, useless litigation would be saved by having some recognized mode of defining where the boundary was ?—A clause in an Act of Parliament giving such a power would be very valuable.

3914. Then you would have a clear boundary on a map showing where the centre line of the river was, supposing that to be the boundary between any two estates; and if in a century or two the course of the river changed to the extent of three or four times its whole breadth, then the defined boundary would settle the rights of any landowner with regard to river frontage ?—Yes; there are many injustices which occur in progress of time, no doubt, by the present system.

3915. You would then have a fixed boundary running in a certain direction, and a man that had once had his river frontage might be shut out from the river by an intervening strip of land ?—Yes. I know of no place or situation in England where there are more encroachments made than on this river in that way. Rumney Island, which separates Eton from Windsor, is claimed by Eton College, and that has been elongating from time to time. The authorities at Eton claim that as their freehold, and they are adding to it daily. Then the corporation of Windsor have a small eyott just above the bridge, and that is getting smaller every day. I have no doubt that originally Eton was an island, and that it was called Eyott Town, or Eton.

3916. (*Mr. Harrison.*) It has been stated in evidence that these eyotts become elongated at the lower end, while the upper end remains unaltered ?—I may tell you how to judge of that. Collier's plan shows the situation of the island about 150 years ago, and it shows that since then, at the upper end, it must have grown up immensely. I know that there is above half an acre of land added to it.

3917. If you object to the Thames Conservancy, will you be good enough to give a sketch of what you would substitute as the future governing body ?—I think I should substitute a body chosen by certain riparian proprietors, not annually, but to remain in office for some time, so as to acquire experience in the management of the river. All such bodies must act through their servants—there must be an engineer and secretary. The Thames Conservancy may have a greater command of capital, and may be able to provide present means to meet present exigencies, but beyond that I see no advantage in them.

3918. Would not they be a body capable of devising works not only for the Thames proper, but for its main tributaries ?—Yes.

3919. Has not the main river branches at its upper end which are as important as itself ?—No doubt it has.

3920. You might purify the Thames, and yet, if the main tributaries were left untouched, a fouling might take place ?—If representatives were chosen by the various towns to constitute the governing body as a commission, they would be coming in with their information from various spots to one central spot, whereas a London board would not be acquainted with the local difficulties.

3921. (*Professor Way.*) Do you contemplate the Commission to be a paid body ?—There ought to be some payment made. It would be better to pay them their expenses certainly.

3922. (*Chairman.*) Do you think that the present commissioners would be a proper body of persons to elect an executive board ?—I think not. I think it is a bad constituency.

3923. If you abolished the commission altogether, would it be sufficient to place the elective power in the hands of the riparian proprietors ?—They are more interested in the maintenance of the river than any other persons.

3924. If taxation is to come from any parts of counties beyond the riparian parishes, how would you then get at a representation ?—You must have those parts represented.

3925. But representation must go with the power of levying taxes ?—Yes, and then the body would be too large.

3926. It would be as unwieldy as it is now ?—Yes.

3927. You do not necessarily get an unwieldy body if the powers are limited to those of election ?—Suppose that the justices of each county in quarter sessions appointed one representative and the corporation of each town appointed another, that would give you a body of about a dozen or fifteen; but the great difficulty is in raising the money. We have no money. We could improve the river if we had the means; but our Acts of Parliament place us in this position, that there are the old lock owners who claim tolls, though they keep no locks. They would not reduce their tolls when we wanted them to do so in order to cultivate a trade. They claim their ancient tolls, and we should be doing neither more nor less than keeping open the river to enable them to get their tolls. When those old prescriptive tolls are abolished, then and not before will the Thames navigation be placed upon a healthy footing.

3928. Is there any precedent for Parliament abolishing such rights without giving compensation ?—In this country we are in the habit of regarding vested interests to such an extent as to impede the public interests, and sometimes a person may, to the great detriment of the public, stand out upon a vested interest which, upon investigation, is found not to be worth a farthing.

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3929. You are aware that a large quantity of water is taken from the river Thames daily for the supply of London?—Yes.

3930. Has that matter ever come before you as a Commissioner?—I have considered it in this way—so very large a body of water being taken from the Thames to supply London, and the wants of London daily increasing, it is necessary to maintain the locks and weirs of the river in order to keep that supply up. As it is now, the river from lock to lock forms, as it were, a series of large tanks. If you were to do away with those locks then the water would run down altogether, and you could not maintain the supply at Teddington. I have known times when the locks have been drawn at Windsor and the water has been permitted to run away so that you might have walked across the river.

3930*a*. Are the water companies called upon to pay any rental for the water they take from the river?—They pay the Commissioners nothing.

3931. Do you know that the East London Waterworks Company takes water from the river Lea, and pays to the river Lea proprietors a very large rental, about 2,000*l*. per annum, as I am informed?—I was not aware of that; but if water companies were compelled to contribute according to the benefits they receive from the Thames and the navigation works, it would be a very legitimate source of taxation.

3932. You think that Parliament might reasonably levy such a rate upon the companies, applying the proceeds to the maintenance of the river, and that that would be an equitable arrangement as between the companies on the one hand and the consumers in London and the interests of the river on the other?—I think the companies might be made to pay a rate for every million gallons they took from the river.

3933. (*Mr. Harrison.*) Do you not think that the daily supply from the tributaries of the Thames is passed on from mill pond to mill pond?—Undoubtedly, because of the locks.

3934. And there would be merely that supply from those tributaries passed on daily down to London if there were no ponds at all?—A certain quantity of water can flow into the Thames, and the same quantity of water must flow out, whether with locks or without locks; the only question is how it is to flow; that is to say, if you take away the locks the same quantity per annum would flow down, but not the same quantity per diem. If, instead of locks all the way down, you had a large tank formed at Teddington, I admit that you might by that means always keep a supply ready, but the tank would have to be an enormous size.

3935. (*Professor Way.*) According to your showing the water companies ought to be anxious about keeping up the navigation of the Thames?—If there was not a weir or a lock upon the river I think that they would be short of water at some periods of the year.

3936. You have spoken of taxing the companies as a proper mode of raising an income, upon whom would the tax really fall in that case?—Upon the consumers in London.

3937. Do they not pay enough for water at present?—Taxation always is, no doubt, a confiscation *pro tanto*, but the navigation cannot be kept up by tolls; then some one must pay the difference, and since, if you do away with all locks and weirs, during certain periods of drought there would be a difficulty in finding water for the London supply, I think the consumers of that water might fairly be called upon to contribute.

3938. (*Chairman.*) If London water companies have to pay a rental, and the London consumers are thus to be taxed, it would be equitable also to levy a rate, according to the volume of water abstracted, upon the inhabitants of Windsor and Oxford and Reading, and other towns taking water in a similar manner?—We pay in Windsor for our water.

3939. Yes, but the person who supplies you with that water pays no one for pumping it out of the Thames?—He pumps it out of wells, the water filtrates through the banks.

3940. Similar to the castle supply?—Yes.

3941. (*Professor Way.*) The consumers of the water at Windsor do not contribute to keeping up the Thames?—No, because our quantity is immaterial, it is infinitesimal.

3942. (*Chairman.*) If one set of persons have to pay for one hundred millions of gallons any tax, whatever it might be, ought you not in equity to pay for one million gallons the one-hundredth part of that tax?—Yes.

3943. If the river is allowed to go to ruin and become altogether unfit for use, the property lying on either side of it will become deteriorated in value?—I think that the riparian proprietors are more benefited than anybody else.

3944. More than the inhabitants of the town of Windsor?—Yes; that is, those who live on the banks, at Reading and at Oxford the same.

3945. Is not the castle interested in the proper maintenance of the river?—I think so.

3946. Then you must tax Windsor Castle for the maintenance of the river?—Yes, I think the castle is benefited greatly by it, and if the Queen paid any taxes she ought to pay a tax for that.

3947. We may take it, may we not, with regard to property generally in the neighbourhood of the river, that the river serves some purpose, either ornamental or useful, and that it would be fair to levy some rate for its maintenance?—I think so.

3948. (*Mr. Harrison.*) Have you been for many years a member of the committee?—For a great many, and I have taken great interest in it.

3949. Regarding the river as a public highway, how far did responsibility rest upon any person to maintain it before the passing of the Acts of Parliament?—There is great difficulty in giving an answer to that question, the whole matter seems to have been buried in the past, and you cannot exhume much about it. The course of events was probably something like this—in the first instance people constructed a mill, and then they wanted to keep up a head of water for their wheels, and so altered the level of the river; and then the public having a right over this highway, required some new means of passing to be provided for them. Then these parties had something constructed like two inclined planes, and over these the boats were hauled; then subsequently, as business increased regular locks were built, and those persons who had got mills claimed a prescriptive right to tolls for passing boats over those locks.

3950. And that was the origin of the old lock dues?—Yes.

3951. The first Acts of Parliament, I believe, were passed to keep those old lock owners in order, not allowing them to charge in excess?—Those old lock owners were always troublesome people to deal with, and Acts of Parliament were passed to control them, but their rights were always reserved and they always received their tolls.

3952. Those old lock owners were generally riparian proprietors?—They were sure to be riparian proprietors.

3953. Are you aware whether some of those old lock owners still possess weirs upon the river?—Yes.

3954. It has been stated in evidence by Dr. Adams of St. John's, Oxford, that St. John's College have within a few years repaired one of those weirs, considering that they were bound to repair it?—Yes.

3955. But the commissioners are not bound to keep their locks in repair?—No doubt. I believe it is the interest of the mill owners to maintain the weirs. I know many mills upon the river worth 300*l*. a year which would not be worth a farthing without the weirs.

3956. If the Thames Commissioners allow their pound locks to go to decay, upon whom would the responsibility fall of passing boats, if there were an old

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lock owner at the mill adjoining?—That is a question which it is very difficult to answer, indeed I cannot answer that question.

3957. Is it not probable that the old lock owner would be obliged to pass the boats?—That would only be one step towards maintaining the navigation. Suppose that an old lock owner were bound by common law to maintain that upon which he received a toll, it is possible that by mandamus he might be compelled to do it, or he might have an action brought against him. So far so good, but when one of our locks, I mean the commissioners' locks, was blown, we should not be under the same responsibility, we are not personally responsible, we have no funds. We are responsible only for orders that we personally issue. The Commissioners are not a corporate body, they do not act under a common seal, and that is how the mischief arises, you scarcely know what you are doing.

3958. (*Professor Way.*) They have power without responsibility?—Yes. I do not intend to incur any responsibility.

3959. (*Mr. Harrison*) Does it not appear to have been a mistake in the Acts of Parliament with regard to highways, both upon land and upon rivers, that there should be nothing for those who lent their money to fall back upon in case the tolls failed?—I think that was an error in Parliament, but of course a man lends his money upon his security *quantum valeat*, he knows what his security is and he lends his money.

3960. Is not this a point that should be specially guarded against in any future legislation?—I do not think you would be able to raise money unless you did guard against it.

3961. Unless the counties and towns on the course of the river come in in some way or other to offer a security, does it not seem a right course for Government to accept the offer of the Thames Conservancy to take the management of the river?—It would be a much more easy matter to hand over the Thames navigation to the Thames Conservancy than to reconstruct a public board. I see much difficulty in the latter course. If the city board is benevolent enough to devote its funds to maintain this navigation, I think it is a very praiseworthy thing on their part, and I think that they ought to be supported.

3962. As a commissioner have any questions been brought before you with regard to millers having raised the head of their weirs, or having in any way tampered with their weirs so as to flood adjoining lands more than formerly?—Yes, we have had many complaints of that kind.

3963. Is it the fact or not that mills do injuriously waterlog the adjoining lands?—I have no doubt they do; it is to the interest of the millers to get as much pressure upon their water wheels as possible, and they do not care at whose expense that is done.

3964. Have the Commissioners considered whether they have power to compel a miller to restore his weir to its former level?—There has often been a discussion and threatened litigation between the mill owners and the Navigation Commissioners, but the matter has generally been adjusted in an amicable way.

3965. Do you remember any discussions as to flashes let down in the upper navigation to assist the passage of barges?—Yes, and there has been considerable difficulty between the mill owners and the Navigation Commissioners in that respect. The mill owners, being desirous of keeping up a head of water, have been very parsimonious as to those flashes.

3966. Have you had any complaints from riparian proprietors that their land has been injured and that their crops have been washed away by those flashes?—Yes, we have had complaints of that kind, I believe. I cannot speak so well to the upper as to the lower navigation.

3967. Have you found that your powers were sufficient to remedy the evil?—They are insufficient to remedy almost any evil.

3968. In the event of a riparian proprietor wanting your assistance to prevent the wasting of his land by such means, have you power to step in and assist him?—We could, I have no doubt, but we should not do it. We should say to him, "That is a question which "must fall upon you, and you must maintain your "own bank."

3969. In the evidence given at Oxford by an old manager of workmen upon the river it was stated that the Navigation Commissioners dredged the bed of the river and thus obtained gravel and sand; that they used the gravel for the maintenance of the towing-path, and the sand they placed upon the banks of the river in certain places with the consent of the proprietors of the adjoining land. That appeared to show ownership in the bed of the river on the part of the Commissioners, and to some extent of the towing-path, but none at all with respect to the bank of the river?—I do not know what evidence was given upon that point, but I have no doubt as to the law that the bed of the river belongs half to the proprietors of one bank and half to the proprietors of the other. Nevertheless, for the purposes of the navigation, the bed of the river belongs to the Commissioners. For example, if a shallow place required to be ballasted, then the Navigation Commissioners would be entitled to give an order to their servants to lower it, because otherwise it might be an obstruction; but they would have no right to alter the bed of the river, except to improve the navigation.

3970. Have the corporation of Windsor any right to ballast the river opposite their frontage?—The corporation of Windsor, being the owners of the soil of the river, would have a right to sell ballast from that soil, provided that they did not interfere with the navigation.

3971. Do you ballast the river?—We are now making byelaws to regulate that matter, because heretofore for many years persons have been in the habit of ballasting the river when they liked, where they liked, and how they liked, and it has been found that they made holes here and there and threw the gravel into heaps, and that the bed of the river has been much interfered with. The river is so deep here that there is not much risk of interference with the navigation; but the corporation thought it was time that they should make certain rules and regulations, and exact a royalty for every ton of ballast taken out of the river, and also that the river should be ballasted under the directions of an officer appointed for that purpose by the corporation.

3972. Could the Commissioners by exercise of their powers put a stop to this private ballasting?—The Commissioners I think could not, unless the ballasting interfered with the navigation, but the owners of the soil might.

3973. Is it the fact that private ballasting has prevailed to such an extent that it is considered almost a prescriptive right?—Yes.

3974. Do such ballast heavers sell the sand and the gravel to the public road makers?—Yes; the practice is very objectionable, and ought to be put under proper arrangements.

3975. Are there any parties who ballast for you as a corporation, or as the local board, for your own road purposes?—No, but the local board buy this very ballast that is taken out of their own river.

3976. And the local board pay those parties for the labour of taking it out of the river?—Yes, and some profit in addition.

3977. Do you not think that if the river was properly ballasted and maintained with a proper bed, it would be a decided benefit to the riparian proprietors?—No doubt of it, and also to the navigation.

3978. It has been stated in evidence that in parts of the river where the banks had been encroached upon considerably by the stream, the encroachment ceased after the hills in the bed had been removed?—The hills in the bottom of the river produced those rapid currents and sets of water.

3979. In the lower part of the river Mr. Leach mentioned that the Thames Conservancy had power, after giving to owners of wharves or banks abutting

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upon the river notice to repair them if they were in a dilapidated state, to compel them to do so?—The Commissioners have no such power.

3980. Would it not be very desirable to have such a power?—Yes, absolutely necessary in order to put the banks of the river into good order in the neighbourhood of towns, where water wheels ought to be constructed. I have no doubt that any Act of Parliament that might be passed ought to give the Commissioners control over the banks of the river, so as to control to a certain extent an improper use of those banks by the riparian proprietors. The bank now is in that position (*describing on a map*). If in the first instance they had turfed it down in that way (*describing*), the change would not have taken place at all.

3981. I believe that that plan is adopted in Windsor Park to a certain extent?—Yes.

3982. You do not think that putting the river into a proper state and deepening it would lessen the floods? Of course if you deepen the river that would increase the sectional area, and in proportion the flood would be diminished; but the floods come down in such tremendous bodies that such relief would be inappreciable, I believe.

3983. The experience of the Conservancy in the lower part of the river is that where, in the upper part of a pond, they have lowered the bed of the river, the floods have diminished very materially?—Yes; deepening the bed gives increased velocity as well as volume.

3984. (*Chairman.*) Do you go much upon the river?—Yes, I do sometimes.

3985. Have you ever noticed that animals which have been drowned are left to float about?—Yes, and I am very sorry to say very much to the annoyance of persons in boats. These animals get amongst the weeds in some stagnant part of our quiet water, and smell most offensively.

3986. Is there any scavenging of the river carried out under your Commissioners?—No.

3987. You do not appoint any person to remove these nuisances?—No.

3988. Do you not think that in any future legislation for the management of the river that is a very important point to attend to?—I think it is just as important that the river should be free from putrefying matter as that a public highway should.

3989. It should therefore be the duty of some persons to keep it clean?—Undoubtedly.

3990. Have you any reason to think that the river Thames is more impure now than it was when you first knew it?—My reason tells me that it must be more impure, because a larger quantity of fæcal matter is thrown into it. I do not speak this from actual experience; I say it as by a matter of inference that it must be so. I have sometimes thought that the weeds which grow in the river absorb a large quantity of sewage, and that this sewage in turn increases their growth. I have no doubt of that, but just where the outlet of the sewer is, the result is very objectionable, for you can see the contamination very clearly—there is no doubt of it. I know that the river is contaminated, and I cannot gainsay it. When I first knew the river the general feeling which now prevails as to the necessity of sewering towns did not exist, and most of the towns had a system of privies and cesspools, and all that matter which now passes down into the river Thames was kept in those small receptacles, which existed in vast numbers.

3991. Did you ever take the Thames water up to drink?—I have done such a thing, but I am not particularly partial to Thames water in its best condition.

3992. It has been stated in evidence that formerly persons could drink it with impunity, but latterly they have found that it made them ill?—All above Windsor I think the water of the river would not hurt you—that is to say, some distance from the town, when the animal matter has been taken up by vegetation. Within a mile below our sewer no doubt the water would be disagreeable.

3993. (*Mr. Harrison.*) Do you not think it would be better to apply the sewage to growth of vegetation on land?—No doubt to throw it into the river is a great public waste, and a loss to the whole community.

3994. Seeing that that is so, and it has been proved that sewage can be applied with advantage to land, do you not think that if the water companies of London were asked to pay towards the restoration of the navigation, it would only be fair, considering the benefits to be conferred on the towns upon the river, to provide that those towns should not turn any of their sewage into the river?—That would not be unreasonable. The sewage of Windsor and Eton ought to more than pay the expenses of the works necessary to separate it from the water.

3995. (*Professor Way.*) To separate it and to keep it out of the river?—No; I mean that the sewage might be utilized and prepared as manure for the land, the pure water being drawn out of it.

3996. (*Mr. Harrison.*) Before last year the Conservancy Board was composed of certain members of the corporation and certain members appointed by Government. In 1864 there were added to these, representatives from owners of steam vessels, owners of barges and wharves, and different persons interested in the navigation of the Thames?—Yes.

3997. Might not some such system as that be extended to the upper part of the Thames by adding to the body of the Thames Conservancy representatives from the different towns on the river?—I think that might be done and be supported, if the Thames Conservancy are prepared to bear the burden of the Thames.

3998. Have you seen a notice for a proposed Act of Parliament for the purpose?—Yes.

3999. Have you observed that it is proposed to rate owners within a certain distance of the Thames?—I have not seen that, but a public company is proposing to do the same thing. It will meet with a great deal of opposition; but I see there is a private company the object of which is to carry away the sewage, to utilize it, to supply water, and to do many things.

4000. Have you seen a report of the Banbury law case?—Yes, and there was a similar case at Uxbridge.

4001. Would any riparian proprietors be able to obtain such a restraining injunction against the corporation of Windsor or the local board of Eton?—There has been such an acquiescence on the part of those proprietors that I think the injunction would not issue; acquiescence would be taken to have condoned the offence.

4002. (*Professor Way.*) You stated some time back that the moment the railway came into operation the traffic on the river fell off?—Yes, it gradually diminished; it increased probably during the construction of the railway, when heavy goods were required for that construction, such as stone, timber, bricks, iron, and so on; but when the railway was opened throughout, the traffic gradually subsided on the river.

4003. Is not that rather opposed to your view, that the traffic, if the river were put into a proper state, could be resuscitated?—Not if the tolls were lowered.

4004. But without a reduction of the tolls you do not hope to resuscitate the trade upon the river?—No, you cannot compete with the railway without that.

The witness withdrew.

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Mr. Thomas Chamberlain examined.

4005. (*Chairman.*) What is your position at Windsor?—I am a coal merchant and building-goods merchant.

4006. How long have you been in business in Windsor?—I have been in business on my own account as master for about 12 years; but I had been in Windsor, in the same business, as a clerk, for 13 years before, making altogether 25 years.

4007. Are you a member of the Thames Commission?—Not that I am aware of.

4008. Do you know the river Thames?—Very well, I live on its banks.

4009. Have you any goods carried upon it?—Nothing worth speaking of now.

4010. Have you had at any former period?—Yes.

4011. What goods?—Coals, nearly all of them.

4012. Where did they come from and go to?—From London to Windsor.

4013. At what rates were they delivered from London at Windsor?—About 4*s.* 3*d.* or 4*s.* 6*d.* a ton from the pool.

4014. Of what tonnage were the vessels that brought the coals up?—Some of them were as high as 90 tons.

4015. What time would it ordinarily occupy to bring a cargo of coals from the pool to Windsor?—Three days would bring it easily, boats have come in two.

4016. At any time of the year would it take longer on account of the state of the river?—If the river was too low the time would be longer, and if it was too full it would be longer.

4017. Then both droughts and floods are the cause of delay?—Yes.

4018. Do you know what state the navigation is in now between Windsor and London?—There is a difficulty with regard to the few barges that there are in getting up in summer time, they get aground.

4019. In what condition are the locks and weirs?—Very much out of repair; still they are useable and answer the purpose.

4020. To what do all the tolls between London and Windsor amount?—I cannot say, but the tolls and the haulage of the barge and the charge for horses dragging against the stream would be all included in the 4*s.* 6*d.* per ton.

4021. (*Mr. Harrison.*) Where do you receive the chief part of your coals from?—Chiefly from Derbyshire.

4022. By what means do they come?—By railway. The coal comes up the North-western line to Willesdon, then across the Brentford junction, and then down the South-western line to Windsor.

4023. At what rate per ton do you get those coals supplied to you from Derbyshire?—The carriage of Derbyshire coals would be about 8*s.* 8*d.* a ton.

4024. Are you aware that the canal competes with the railway to Oxford, and from that neighbourhood?—Some merchants whom I know at Oxford told me so.

4025. Did midland counties coal ever come by canal to Oxford and thence by the river to Windsor?—No, but it has come by the Grand Junction Canal to Brentford.

4026. Would that be a shorter distance than by Oxford?—I think the route by Oxford is rather the nearer.

4027. How does the price of coals from Derbyshire compare with the price of sea-borne coals?—The price is much lower, and that is the reason why they are used. Within my experience in the coal trade, all about Windsor, people used to use Newcastle coal, but now I should say that nearly nine-tenths of them use Derbyshire coal.

4028. What is the price of the best coal from Derbyshire?—Here it is 24*s.* per ton.

4029. And of the best sea-borne coal?—30*s.* There is a very good coal from Derbyshire that is sold in Windsor at a guinea a ton.

4030. Good household coal?—Yes.

4031. If there were any competition at all it would be not between sea-borne coal and Derbyshire coal, brought as it is now, but between inland coal brought by one route and inland coal brought by another?—Just so.

4032. Do you think there is no probability of competition arising either by the Grand Junction up the Thames to Windsor, or by the Oxford canal down from Oxford, with the present system of carriage by railway from Derbyshire?—The river would not have any chance with it, and besides the river has lost the Newcastle trade, because the Great Northern Company encourage the coal traffic on their line so much by the lowness of their rate and lending their trucks. Coal is thus brought from Newcastle all the way by railway.

4033. Can you get that coal at Windsor more cheaply than out of the pool?—Yes, it is sometimes a little more and sometimes a little less; the average price is quite as cheap when the coal is brought by railway, and then we get no breakage; the coal is loaded at the pit's mouth and it is brought here in the same trucks.

4034. (*Chairman.*) Is coal liable to injury by jolting from the shunting of the trucks on the journey?—No, nothing worth speaking of.

4035. (*Mr. Harrison.*) I think it has been stated by coal merchants of Windsor that if the Thames were put in a good state the traffic would be restored?—I sell more coals than anyone else between Windsor and London, and I should say that there is not the least chance of it.

4036. Do you trade in timber or slates?—In builders' materials, except timber. They are all brought by railway—cements, lime, drain pipes, bricks, slates, and tiles.

4037. (*Chairman.*) Is there any delay in the deliveries from want of sufficient room at the railway station at Windsor?—Very little difficulty here with the South-western Company. They have tolerably large accommodation, but the Great Western Company have not much space. I have not, however, myself suffered from it.

4038. (*Mr. Harrison.*) How are heavy goods, groceries and things of that kind, brought down to Windsor?—By railway.

4039. Might they be brought by the river?—Some of the heavier goods that are brought direct from the docks might, such as hogsheads of sugar, and some little tea, but the bulk of the goods would still come by railway. It is more convenient at London to put them on the line than on the river.

4040. (*Chairman.*) Is there any brewery in or near Windsor?—One very large one and two or three other small ones.

4041. Would beer go down in that way to London?—It formerly did when they cultivated a trade in Windsor ale, but what goes now goes by railway.

4042. Is there a greater liability to plunder on the river than on the railway?—I think it is very likely. There would certainly be greater liability of the goods to exposure; things are not so well protected. You have asked some questions of a previous witness about summer traffic coming here. I think that either he misapprehended you or you did him. No traffic comes up here from London, except a rare pleasure boat or so, which makes the excursion to Windsor as boats go up the Nile, and now and then some of the swan-hoppers come up to Windsor. Then the corporation of London come up about once a year, about half a dozen persons. These are all that would come up during the year. Most likely, if the locks were so altered as to admit of the passage of steamers easily, and the tolls were not heavy, there would be a large amount of pleasure traffic to Windsor. I should add to what I have already said, as to coal supply, that Windsor is also partly supplied by the Great Western Railway from the neighbourhood of Ruabon and Dean Forest Windsor Castle is partly

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supplied from that neighbourhood. What steam coals are used are brought by the Great Western.

4043. Will you be so kind as to furnish the Commissioners with the quantities of coals that are brought to Windsor for consumption from different directions?—Yes, I can give a tolerably close estimate of them.

4044. (*Chairman.*) Are as many as 30,000 tons per annum brought to Windsor?—Something between 20,000 and 30,000.

4045. What coals do the gasworks use?—I cannot tell you at this moment.

4046. (*Mr. Harrison.*) With what coal did you supply them?—I used to get Newcastle coals.

4047. (*Chairman.*) Did you hear the mayor say that he would prefer giving 1*s.* a ton extra for coal that was brought by water?—Yes.

4048. Would you do so?—No; and the practice of the mayor is not according to his theory, because he brings his coals by railway.

4049. Is not that because the river is in a condition to preclude traffic of almost any kind coming upon it?—It is not so practically. There is no difficulty in the conveyance of coals now between Windsor and London, other than the expense, except indeed at the time of very low water and high floods.

4050. Have you seen a steam tug that runs from Reading to London?—Yes, it comes past my house.

4051. Have you ever considered whether it would be possible to use steamers for traffic from Windsor?—Before we took our trade upon the railway we had the use of steam tugs of the same character. I used then to tow barges up to Windsor.

4052. You do not do so now?—No; complaints were made that the steam tugs washed away the banks of the stream, and the proprietors of the tugs said that the heaviness of the tolls prevented them from towing our coals at a profit.

4053. If the tolls complained of as being so heavy could either be materially reduced or altogether abolished, and the locks and the weirs put in good condition, would it not have the effect of getting up what I may call a wholesome traffic upon the river, in spite of the railways?—You could not compete with the railways in carriage of coals.

4054. Nor in carriage of groceries?—No, except such as could be handed easily out of the docks into barges.

4055. Is any manure brought up the river by barges?—I have not seen any, but there is a great deal brought by railway from London; stable manure is brought down the South-western line.

4056. Market produce goes up and manure comes back?—Yes, that is so as to the market gardeners up higher; below, down here, the manure comes for purely agricultural purposes for the farmers.

4057. (*Professor Way.*) I suppose there is no real competition between the river and the railways now?—The traffic on the river is almost *nil.*

4058. It is not probable, perhaps, that the railway charges could be diminished?—They could be, but the railway charge from Nine Elms to Windsor is not 4*s.*, as the mayor said, for he included in that charge what he pays for a barge to Nine Elms; the railway charge is only 3*s.* 3*d.*, and the railway company brings the coal all the way down and gives him station accommodation at Windsor.

4059. How many miles is it?—Twenty-five.

4060. (*Chairman.*) They charge 39*d.* for 25 miles?—It is scarcely 25 to Nine Elms.

4061. (*Mr. Harrison.*) What is the charge per ton from Sunderland to Windsor?—About a halfpenny a ton per mile. It is considered by railway companies that if they bring coals any long distance at a halfpenny a ton per mile it pays them very well.

4062. (*Chairman*) In the event of the river coming into competition with the railway, do you think that the railway company could profitably bring the price down, instead of 3*s.* 3*d.* to about 1*s.* or 1*s.* 3*d.* a ton?—Rather than lose the traffic I am persuaded that they would; the rate was lower when the railway won the traffic from the river; afterwards the railway raised the rates.

4063. (*Mr. Harrison.*) What were the rates before they were raised?—From London to Windsor I think they were something like 5*d.* or 6*d.* a ton lower than they are now.

4064. (*Professor Way.*) You think that it would be necessary in any legislation upon the subject to remember that competition by railways must very seriously affect the future revenues of the river?—Yes.

4065. In point of fact we have no means now of knowing at what price railways could carry goods?—You may take it for granted that the railway company can bring goods of that heavy character at 1*d.* per ton per mile from so short a distance as London to Windsor; for long distances it pays well to carry at a halfpenny.

4066. You do not believe that under any circumstances the river could compete with that?—No, for after you had lost the advantage of the tide that would float you to Teddington you would have to drag against a strong stream, and you would want a powerful team of horses to do that.

4067. (*Mr. Harrison.*) Is the coal from Sunderland and that neighbourhood taken further south than Windsor by railway?—Yes, Richmond is mainly supplied in that way, it has scarcely any by river now.

4068. Is it taken on southwards, to Southampton, for instance?—I am not prepared to say how far Sunderland coal goes, but I believe it goes down the South-western line some distance.

4069. (*Chairman.*) How is coal brought to London from Newcastle, by sailing colliers or by railway?—Some comes by colliers, but the greater proportion comes by steam vessels. The greater proportion of the coal does not come upon the London market at all. Some firms hire steamers that run backwards and forwards once a week.

4070. Have you heard it stated that railways can beat steam colliers in economy?—I know that that is the case.

4071. (*Professor Way.*) That is as far as the Pool, between the Tyne and London?—Yes. I know that some large London merchants are now giving up their steamers which they used to run to the north, and are bringing coals by the Great Northern line.

4072. That cannot be in consequence of the navigation having fallen into a state of decrepitude?—No.

4073. That is the result of legitimate rivalry; that is to say, the railway shows itself capable of successfully competing with water navigation?—Yes. If there were a railway direct from the north for mineral traffic only, you would find that London would be mainly supplied by it. The difficulty now is that they cannot bring coals fast enough.

4074. Passenger traffic interferes with the heavy traffic?—Yes. I may mention that I am lessee of the fishery that Mr. Darvill spoke to you about.

4075. What rental do you pay for it?—20*l.* a year.

4076. (*Mr. Harrison.*) Does it include any land?—Two or three little eyotts.

4077. Of what acreage are they?—They are said to be about three acres, and perhaps you might find two.

4078. Have you planted osiers upon them?—Yes. At present I make no use of the fishery.

4079. You pay 20*l.* a year for the eyotts?—Yes.

4080. (*Chairman.*) What fish do you catch?—Plenty of jack and some nice perch, and now and then some fine Thames trout.

4081. Have you had any fish-breeding in this district?—Mr. Frank Buckland put in several thousand young salmon trout in this district, near to Windsor.

4082. With what results?—I have not heard.

4083. Do you know when they were put in?—I think it was some twelve months ago.

4084. Should you have heard if any result had been obtained?—They are scarcely grown yet to any size, they are mere fry.

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4085. Is anything deleterious passed into the river above you which you have reason to believe interferes with your fishery ?—No, nothing whatever. The Thames is very pure, all in my reach, except now and then when they fling in a dead dog or a dead cat, which floats down to my wharf, and lodges perhaps in one corner, and I push it off.

4086. Do you know that eels will eat a carcase like that ?—I have seen other fishes attack it, but not eels.

4087. (*Mr. Harrison.*) Have you lived on the banks of the river by some of these eyotts for years ?—Yes, I live next to Windsor Bridge.

4088. Have you observed any increase in the size of those eyotts ?—I have observed a decrease in size of that one (*pointing to a map*) and of that one (*pointing to the same*), and there is another that is not marked here which is almost gone away, and that is why I suppose it is left out of the map.

4089. Have you ever seen any encouragement given to the growth of these eyotts by planting osiers ?—Not to any extent. Some of the tails of them are elongated a little, being in still water. The earth that the river takes away from this side (*pointing to the map*) flows away and gathers at the tails of these eyotts.

4090. (*Chairman.*) Do you exercise any rights of ballasting or of dredging there ?—No.

4091. That is not included in the rental you pay for the fishery ?—I am not quite sure of that, the corporation are just about settling that point ; there is no ballasting done now, there are warning boards forbidding the people, for they used to do it there, but they do not do it now. The river is tolerably deep in our reach, but up above Clewer the river is in a very bad state.

4092. Have you any reason to think that the river is worse now than when you first knew it, as to your fishery ?—Certainly not ; many of the drains that used to flow into the river do not flow into it now.

4093. Do you know whether the sewage of Windsor is injurious to the fish below ?—I know that a certain amount of sewage mixed with water will make fish fat.

4094. (*Mr. Harrison.*) Do you know of any settlement of sewage below the outlet of the sewer, and of any bank being formed by it in summer time ?—Yes, and it is very offensive. Our sewage is discharged just above Albert Bridge, and in summer time it is undoubtedly a great nuisance, you may smell it as you pass over the bridge.

4095. Do you suppose that the fish like it ?—Some of them do.

4096. What kinds of fish ?—The roach are always fat about the mouth of that sewer.

4097. That is the sewage as it comes fresh out of the sewer ; but what I was speaking of was a bank of sewage that is deposited lower down and is decaying there ?—I suppose that fish take care not to go where the sewage is too strong for them, but go where it is sufficiently diluted for their appetites ; the banks are very offensive by reason of the deposit of the sewage matter.

4098. (*Chairman.*) Are you a member of the present Town Council ?—Yes, and I take considerable interest in its affairs as a board of health and as regards the sewage.

4099. Has the question come before you as to the utilization of the sewage ?—Yes, the question has been before us, but not very definitely until Mr. Menzies came before us with his scheme. I was one of a deputation that was appointed to go with him to see his scheme in operation at Broadmoor, it appears there to answer admirably.

4100. Did what you saw there give you any hope that some process not unlike that might be brought into use in Windsor ?—Yes, the strongest hope, I have great faith in it, and I should not have any hesitation whatever in saying that the plan would succeed ; and if I was rich enough I should not mind taking the whole burden upon myself, provided that there was a separation, as Mr. Menzies proposes, of the rainfall from the ordinary house sewage.

4101. (*Mr. Harrison.*) The main sewer that meets the chord of this arc (*pointing to a plan*) has been described by the town clerk as being very nearly a level ?—There is not much fall in it, not many inches.

4102. When the river is flooded at the outlet what becomes of the sewage of the town ?—It is blocked back, but not into the town.

4103. Where does it go ?—Practically it has not come to be a nuisance to Windsor.

4104. What was the feeling of the corporation as to handing over the management of the Thames to the Thames Conservancy ?—I cannot say, they have never expressed an opinion ; my individual opinion is, as to that and all other matters, that I do not like so much centralization, and that there should be some local influences brought to bear.

4105. Do you think that those local influences or persons would also bear the burden of supplying the money that was required ?—They should certainly to the extent that they have authority over the river.

The following statement was handed in :—

The COAL TRADE at WINDSOR and ETON.

ESTIMATED QUANTITIES and QUALITIES of all COALS brought in Twelve Months from

—	Tons.	Route.
		Tons. Tons.
Newcastle and Sunderland	2,500	S. W R. 2000 ; River, 500.
,, Gas Coals -	2,500	G. W. R. (from River at Brentford)
Derbyshire, Yorkshire, and Lancashire - - -	12,000	S. W. R. (viâ Brentford.)
North Wales (Ruabon District) - - -	3,000	G. W. R.
Forest of Dean - -	1,500	G. W. R.
South Wales (Steam and Malting) - - -	1,000	G. W. R.
Total - -	22,500	

CARRIAGE RATES.

From the pool, London, by barge -	4*s*. 6*d*. per ton.
Ditto by S. W. R. (including barge to Nine Elms) - - - - -	4*s*. ,,
From Brentford Junction for all midland coals - - - - -	2*s*. ,,

The Commission could best obtain the various rates to this Brentford Junction from the traffic managers of the North-western and Great Northern, as the rates vary from each coal district to that junction.

SELLING PRICES OF COALS.

These are not altered so frequently at Windsor as in many other places, a longer average being taken and prices fixed accordingly. This winter's prices are as follow :

Best Sunderland - - - -	30*s*.
,, North Derby and York - -	24*s*.
,, South Derby - - - -	21*s*.
Welsh Steam Coals - -	22*s*. and 23*s*.
Newcastle - - - -	28*s*.
Ruabon - - -	23*s*. and 24*s*.
Forest Coals - - - -	21*s*.

All delivered.

THOMAS CHAMBERLAIN,
Thames Street,
Windsor.

29th November 1865.

The witness withdrew.

Adjourned till to-morrow, at 10 o'clock.

Town Hall, Windsor, Wednesday, 29th November 1865.

PRESENT:

ROBERT RAWLINSON, Esq., IN THE CHAIR.
JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

The Rev. CHARLES OLD GOODFORD, D.D. (of Eton), examined.

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4106. (*Chairman.*) You are Provost of Eton?—Yes.

4107. Do you suffer any inconvenience at Eton by flooding?—Occasionally we do, but not so much now as we used in former years, when I was a boy at school.

4108. Have any works been executed of any kind to prevent floods?—I think not. I really do not know the cause why we are not so highly flooded now as we were 30 years ago.

4109. There is a local board established for Eton?—Yes.

4110. Have they executed works of main sewerage?—Yes.

4111. Is the college connected with those works?—The sewerage of the college strictly speaking is coeval with the building itself. About 400 years ago there was a system of flushing the sewers running all round the college.

4112. Is that in operation now?—Yes; about 21 years ago, I think in 1844, a fresh system of sewerage was constructed for all the houses within the precincts of the school, and that was connected with the college sewer.

4113. Are there any cesspools on the premises that you are aware of remaining from the old times?—I believe one still exists, but I do not know of more than one.

4114. Has there been any re-modelling of the privy conveniences for the college recently?—Nothing I believe within the last 20 years. Every house then was made to drain into this system of sewerage; I think that was in 1844. The college did all the work, and I think it cost 4,000*l.*, or somewhere thereabouts.

4115. The sewers are covered?—Yes.

4116. Do you suffer any inconvenience at any time of the year from the sewers?—I think not; they are all flushed at stated periods.

4117. Do you find that when the Thames is flooded the sewage is driven back upon you?—No, it is carried off. In the college itself, strictly speaking, when I was a boy the privies were upstairs, and in winter when there was a flood you could hear a great body of water rushing past a long way beneath you, but the system of privies is now altered and made much more convenient.

4118. Were the privies placed in parts of the college that projected over the outer wall?—No.

4119. Not like the old garde-robe towers of the old castles?—No; under the Health of Towns Act the whole town is drained into the college sewer. The college gave permission to the town in order to save considerable expense to let their sewage drain into our sewer.

4120. What becomes of your sewage?—It floats into the river below the college.

4121. What is the population of Eton?—I think somewhere above 3,000.

4122. What population is there in the college?—When the boys are there upwards of 1,000.

4123. Then the population of Eton and the college would be about 4,000?—That is about the number.

4124. Have there been any complaints made as to the sewage being turned into the Thames?—I never heard of any.

4125. (*Mr. Harrison.*) At what point is it turned in?—Just below the college, below Windsor bridge and below the weir.

4126. Below the engine-house?—Yes.

4127. (*Chairman.*) And below the waterworks?—Yes.

4128. The castle waterworks are at that engine-house?—Yes.

4129. (*Mr. Harrison.*) Then it is between Black Pots and the college?—Yes.

4130. (*Chairman.*) Is there any public supply of water to the college or do you supply it?—We have an engine that supplies water to some of the houses.

4131. Of your own?—No, it does not belong to us.

4132. Is it for the supply of Eton proper?—It supplies houses, I imagine, in the town, but I am not certain.

4133. Have you any wells on the premises?—Yes.

4134. Do you obtain water from them?—Yes, and capital water. Our cloister pump is quite celebrated for the purity and beauty of its water.

4135. (*Mr. Harrison.*) At what level does Eton stand above the river?—I can hardly say, but it is very slight.

4136. What becomes of the sewage when the river is flooded?—I never see anything of it.

4137. It is not driven back at all?—I am not conscious of it at all.

4138. We understand that in a flood the sewage from Windsor is backed on to the Home Park?—That is somewhere lower down.

4139. They have there a considerably greater fall than you can have, and there is a weir, is there not, between your outlet and theirs?—No, I think not. If the sewage had been driven back we should have seen it or heard of it. The meadow is immediately in front of some of the houses and close to the college kitchen, and close by there is an eyott also where the Fellows turn out a horse or a cow occasionally.

4140. (*Chairman.*) Is the river much used by the boys for pleasure purposes?—Yes.

4141. You consider that the preservation of the river for that purpose would be exceedingly important to the school?—Very important; boating is one of the most healthy recreations. Both bathing and boating are the main features of the boys amusements in summer time.

4142. (*Mr. Harrison.*) Has the health of the town improved since it was sewered?—The health of the college certainly has, but I do not know so much of the town.

4143. Has that been shown less by deaths than by illnesses?—By illnesses; we very rarely have an instance of death among the boys.

4144. Is there any land convenient for the utilization of the sewage, if you were obliged at Eton to apply it to land, instead of turning it into the river?—I do not know.

4145. Is there any land upon the banks of the river belonging to the college?—Yes, but it does not extend far, only to about Black Pots.

4146. (*Chairman.*) Have you any fishery rights?—Yes.

4147. Do you exercise them or lease them?—They are leased.

4148. They are not very large, I suppose?—No.

4149. Do you take any charge of the river for your own purposes, for boating or otherwise?—There is one part that we occasionally ballast to keep the stream clear, and I understand we have suffered a good deal by a larger head of water being kept at the Windsor weir, which causes a silting up below so as to fill our stream more than used to be the case.

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4150. (*Mr. Harrison.*) Do you mean the weir below Datchet?—No, the Windsor weir.

4151. (*Chairman.*) What is the ballasting done for?—To keep the stream clear, because it fills up so.

4152. Have you any power to prevent improper ballasting?—I imagine that we have the land on both sides. I always understood that just that part of the river belongs to us.

4153. Could you prevent parties from ballasting there?—Yes, I imagine so.

4154. Are you one of the Thames Commissioners?—I believe I am an *ex-officio* member, but I never received notice, and I never acted.

4155. Have you never taken any part in their proceedings?—No, I have never been summoned.

4156. If you have not received notice, I suppose no other person at the college would have received notice?—No, other members of the college may have received notice; I have only been in office for three years.

4157. From your position at the college would you not have received notice if you had been recognized as a member of the commission?—I suppose so. I have been told that I am *ex officio* a commissioner.

4158. Have you any suggestions to offer as to the improvement of the Thames in connection with the colleges?—No, I think not. I should be very sorry to see the river otherwise than navigable for the boys' boats and fit for bathing purposes.

4159. You would not like to hear that one of the locks below you had been washed away and had left the river-bed dry, so that your pleasure boats could not use the river?—No, I think that would be a great pity.

4160. Is the river a source of income to the college otherwise than by the fishery, or are you put to any cost by it; have you any taxation or rates to pay?—None that I am aware of.

4161. Suppose it was necessary for the improvement of the river to incur expenditure, do you think there would be opposition offered on the part of the college to contribute any equitable sum in proportion to that paid by other persons?—People take such very different views as to the meaning of the word "equitable" that I should like to know what it meant here before I answered the question.

4162. It is quite clear that if work is to be done that will cost money, money must be found by some persons—by persons interested—and your college, for instance, is interested as being situated on the river. How much would be equitable would depend upon the amount proposed to be levied and the benefits to be received by your college?—Yes, it would depend upon that.

The witness withdrew.

Mr. C. H. Witherington.

Mr. Charles H. Witherington (of Sonning) examined.

4163. (*Chairman.*) Do you reside on the bank of the Thames?—Yes, at Sonning, about 3½ miles below Reading.

4164. Do you own a portion of the Thames frontage?—Yes.

4165. Do you own one or both sides of the river?—The towing path is on the opposite side from me, and there I claim a right to net, and no one else can do it.

4166. Do you own any mill?—Yes, I own a corn mill at Sonning.

4167. Is it an old mill?—Yes, it has been built from 90 to 100 years, I understand.

4168. Not longer than that?—There was a mill before and it was burnt down.

4169. A mill and a weir?—Yes.

4170. What is your working head of water?—4 feet and 1 inch.

4171. In ordinary water?—Yes, that is moderate.

4172. What number of wheels have you?—Two ground shot wheels.

4173. Of what horse-power do you consider they are?—In fair water about 30 horse-power, we have not more than 10 with the amount of flood we have at present.

4174. Is the mill occasionally stopped altogether?—Very rarely; we have been stopped for two months at a time altogether, but that was in a very high flood in 1852 or 1853.

4175. Is the mill exclusively a corn mill?—Yes.

4176. Do you use the river for navigation?—We do. Boats now come down to the mill-head and take in the flour.

4177. Is the condition of the river better or worse than it was when you first knew it for purposes of navigation?—It is very much worse, decidedly worse.

4178. Is that in consequence of the damaged state of the locks or the silting up of the ponds or both?—Principally in consequence of the silting up between Reading and my residence.

4179. Did you know the river before the railways were opened?—Yes, I knew it, and I have a book showing the receipts of the old lock when, in 1852, I bought the property. I am an old lock owner as well as miller, the receipts were about 96*l.* a year, but now they are between 25*l.* and 30*l.* for the old lock.

4180. Do you perform any service for those old lock dues?—Originally, as the Commissioners are aware, the millers had to stop their mills on Wednesdays and Saturdays to allow boats to pass up; the boats were drawn up by a windlass and let down.

4181. That practice has ceased?—Yes.

4182. But yet you still levy the dues?—An Act of Parliament was passed to enable the commissioners to make a new cut, and indemnified the mill owners by giving them lock tolls called the old lock dues, which you see put up at every lock house.

4183. Is there a system of flashing adopted at your mill?—No.

4184. Cannot you send flashes down?—Barges do not require flashes now, since the new cut was made.

4185. Has your mill head been altered in level since you have known the mill?—I think not.

4186. Have any complaints been made by proprietors above you of flooding their land by back water?—No, Mr. Palmer, my next neighbour has merely requested that I would draw as much water as I could, which I have always done. I have always been on very good terms with him.

4187. Does the water in a flood flow over any adjoining land?—Yes, but very much more below my mill, very considerably more than above.

4188. If a flood occurs in summer or autumn time, it may do great damage to the grass or to the hay?—Yes, it ruins them.

4189. Has there been any talk of embanking that part or doing anything to keep flood water from the land?—I am not aware that there has.

4190. Are you a Commissioner?—Yes.

4191. Have you acted at all?—Yes, always.

4192. Are you one of the committee?—Yes, I have only been so during the last month. I was put on at the last meeting at Reading.

4193. What is your opinion of the present condition of the commission; do you think they are in a very hopeful condition or otherwise?—Not at all, I am sorry to say.

4194. Have you considered any method of getting out of your present difficulties?—I think we cannot go on as we are going and as we have been going, our locks will all cease to be useful at all very soon.

4195. Have you considered the kind of governing body that might be established for the better maintenance of the river?—There is no question that a smaller number of Commissioners would be better; at least that is my opinion.

4196. Suppose a flood carried the lock down adjoining your mill, what effect would that have upon your business?—It would tell very materially upon it, but it would not stop me entirely, because I should immediately apply to the surveyor.

4197. Do you maintain your own weir?—Yes, once the weir was lengthened, that was some years ago, and the commissioners took charge of that part of it which was added, I think about 60 feet.

4198. Have you any rights of fishing in connection with your mill?—Yes.

4199. Do you retain them in your own hands or do you lease them?—I retain them.

4200. If it is a fair question to ask you, what are they worth per annum?—I have given up the catching of the eels to my son, who has kept an account of it until the last flood, and he has been out of pocket during the last three months.

4201. The fishing has not been considered profitable?—Not at all.

4202. You have caught eels?—Yes.

4203. Do you ever catch trout?—No, there used to be trout in the river, but they are getting fewer every year.

4204. Has anything been done by the association for improving the fishing of the Thames, in the way of putting in young fish?— I have been informed that they have put in some below Henley, but not near us.

4205. Would there be any difficulty in fish passing upwards from the pool below you?—No, trout would certainly go up the river without any difficulty.

4206. What length of time does it take to navigate a barge from London to your mill now?—A boat towed by horses would take perhaps three days in moderate water to come from London to Sonning. Within the last month a steamboat on the water has left my house in the morning at 6 o'clock and has got to London the next morning at 8, at the Kennet wharf.

4207. Do you refer to the Reading steamer?—Yes.

4208. It calls at your place and takes down things for you?—Yes, occasionally.

4209. Do you find any alteration take place in the banks of the river, a wasting away in one place and a gathering together in another?—Yes.

4210. Have you any eyotts in the river near to your place?—Yes, there are some eyotts so near to one another that four out of the 11 arches at Sonning bridge are filled up by accumulations, and withies have been planted in the soil.

4211. By the proprietors?—Yes, I presume so.

4212. Is there more or less obstruction in the river now than there was formerly by growth of weeds und extension of osier beds?—No doubt a great deal more now.

4213. Are you at all troubled at your mill with carcases of dead dogs and other dead animals which float down the river?—Yes, it is a rare thing to go to my lock and not to see from 4 to 12 dead dogs and cats.

4214. What do you do with them?—We pass them on.

4215. Are you at all troubled by masses of weeds coming down upon you, which some millers above you have cut in order to clear their mill-head and then passed on to you?—Yes, that is always an annoyance at every mill in the kingdom to a certain extent.

4216. Those weeds are passed down, and I suppose, your wheel being ground shot, many of them pass under the wheel?—Yes.

4217. Would it not be an improvement in that respect if every miller was made to take the weeds out of the river instead of passing them on?—Every miller clears the channel just above him for his own benefit. In summer we are generally short of water, and we cut the weeds, when they grow up so as to impede the course of the river.

4218. You are not bound to take the weeds out of the water?—No, we should not think of doing that, we take care at our own mill to send them along down the river.

4219. And you do the same with the dead dogs and cats?—Yes, they all go down; we do not take them out, we are too glad to pass them on to bury them, we should want a regular cemetery.

4220. Would it be a very proper thing for the board, who takes charge of the river, to order the river to be cleared of all these impurities, and employ some persons to take the dead animals out and bury them?—Yes, I think so, but I think the best way would be to prevent them being thrown in.

4221. But in the event of their being thrown in, the next best thing appears to be to take them out and bury them?—Undoubtedly.

4222. (*Mr. Harrison.*) Have you made any observation as to the effects of flooding upon grass?—It depends entirely upon the time of the year when the flooding occurs. I consider that a flood in November would rather benefit than injure the meadow, that is if it did not lie too long.

4223. Within what time do you consider it is beneficial, or when does it become injurious?—I do not know that I can answer that question.

4224. Is the water of the flood stagnant or flowing?—It is stagnant in some parts, flowing in others.

4225. Have you ever observed the effect when the water is constantly moving?—Yes.

4226. Has it the same effect on the land then as when it is stagnant?—Where it runs freely over the land I think it would do less mischief than when it lies upon it for some time.

4227. Have you any meadows above your mill?—Yes.

4228. Have you made any observations as to the height which it is most desirable to have the water for the growth of grass?—No, I have not, but I should prefer never having water upon the meadows at all. I would prefer what is called a dry meadow.

4229. With the water how much below the surface?—I do not care how much.

4230. So as to be the same as if the soil was thoroughly drained?—Yes, the nearer the water is to the meadow the coarser the grass is.

4231. When did the Commissioners extend the weir of which you have spoken?—I do not know, that was before I came to Sonning.

4232. Do you know what the object of it was?—The object was, I believe, to lessen the overflow above the weir.

4233. (*Chairman*). It was a lengthening of the weir to reduce the head?—Yes, so as to take a larger body of water; it is a very long weir.

4234. (*Mr. Harrison.*) Could you pass the whole of your flood water over a fixed weir such as you have, if it was of a sufficient length?—Yes.

4235. Would that be a desirable plan?—We millers on the stream might help each other very much if we gave full force to the water in flood times like the present, we could draw away a larger portion of the water than we now do, but then we could not work our mills.

4236. If the weir was of sufficient length it would determine the height of the water at the mills in case of floods, and it would not be in the power of the millers to interfere with it?—The water would flow back from below us. We have what is called a turn so that occasionally the water, which usually runs one way when it gets to a certain height, runs back the other.

4237. Where is that?—That is about half-a-mile from my house along the flat on the Oxfordshire side.

4238. Towards Shiplake?—It runs into the Thames a little above Shiplake.

4239. I think the water above your weir is rather shallow and deepens gradually upwards?—Yes, there are 20 feet of water.

4240. And there is a considerable depth from the weir down on the lower side?—Yes.

4241. The effect of that great depth of the weir on the lower side is to make a very deep hole is it not?—Yes.

4242. Is there not a large bank formed a short distance beyond?—Yes.

4243. How does that affect the tail water at your mill?—Not at all. The water that goes over the weir must run round to the tail of the mill.

4244. I think the tail-race enters the river below the hill that is formed by the weir?—Yes, it runs

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round for a quarter of a mile, and then comes in again by the mill.

4245. Do you know Caversham ?—Yes.

4246. Do you remember a hill that is formed there by the water flowing over Caversham weir ?—Yes, I have seen it, but not very lately.

4247. Is there any such hill formed below the outlet of the pound lock at Sonning ?—Yes, but not to the same extent, because there is not so large a body of water going through the pound.

4248. Does that hill at all stop the tail water at your mill ?—Not at all.

4249. I think you said that in case of a flood the tail water backs against the mill a good deal ?—Yes, very much.

4250. Is that from its being throttled near the mill ?—No, I do not apprehend that is the cause. Perhaps it is more in consequence of the silting up of the river.

4251. Then if the river was put into proper condition for navigation, and kept at a proper depth, would not your mill be benefited by the water not tailing so much ?—Yes, it would be so.

4252. Do you suffer any annoyance from the sewage of Reading as well as from dead dogs and cats that come down the river ?—Sometimes it is very bad indeed, and the smell is dreadful.

4253. What distance are you below Reading ?—3½ miles.

4254. The effect of the sewage of Reading being turned into the river is distinctly felt by you at a distance of 3½ miles from Reading ?—Yes, undoubtedly, and annoyingly so ; but it is not always the case.

4255. Is it the fact that the reach between you and Reading is a very fine one ?—Yes, as fine as any part of the Thames.

4256. Wide and deep ?—Yes.

4257. Notwithstanding that considerable body of water, of great depth and width, you are still occasionally greatly annoyed by the sewage from Reading ?—Yes, you would see it as you went up the river, banks are formed and quite high ones, so that there is scarcely room in one place for a good-sized barge to get down in low water. If you put your punt pole in, you will see something like ink coming up following the pole.

4258. Is the present lock the remains of the old lock ?—It is a wide lock, I presume of the same width as the old lock, which existed when I came to the mill; but all has been renewed since I have been there ; we are bound to keep it the same width.

4259. If the commissioners were obliged to give up the navigation and the pound lock was given up, would you, as an old lock owner, be obliged to pass boats when they came to your mill ?—No, I think not. I do not think boats could pass up and down the river if the water was drawn away, and allowed to run its course.

4260. What are your responsibilities as an old lock owner ?—My responsibilities, as an old lock owner, are very heavy indeed, for I have to keep the greater part of the weir in repair, and the lock which the barges used to pass through. I have nothing to do with the navigation.

4261. Can you give us an estimate of the cost of the repairs in past years of those two works ?—The cost of the repairs to the lock since I have had it has been between 600*l*. and 700*l*. I put the lock in new altogether, and then we had to make a dam in front of it, and that was all very expensive work, that was since 1852.

4262. What do you reckon to be the yearly cost of the repairs ?—I do not know, that is so uncertain. I hope the work now done is to last a great number of years.

4263. If there was no navigation would you not have to maintain a lock and a weir for mill purposes ?—Yes ; because of course the water would run away if I did not.

4264. Before, when the old lock was used for navigation purposes, you passed boats by letting the water out of the pond above ?—Yes, but that was the case before I came there.

4265. Now you are not called upon to pass any water in the shape of flashes ?—No, they can pass without.

4266. If the pound lock is kept in proper order, the only water that is wasted to you as a miller is that which is used to pass boats from the upper to the lower reach ?—What we call the pound water.

4267. You are in a happier state than the millers towards Oxford, who send a large quantity of water past as flashes ?—Yes, only that they have not these heavy expenses for weirs and locks that I have to bear.

4268. (*Chairman.*) With regard to the Reading sewage, is it worse now than when you first went to your mill ?—It is, and it gets worse every year ; there is more and more filth. Reading is an increasing town.

4269. As a matter of course, if the authorities of Reading choose to make a system of main sewers, and discharge the whole of their refuse into the Thames, the stream by you must be made still worse than it is now ?—Yes.

4270. And there are other towns and villages above Reading which also tend to contaminate the river as it passes you ?—No doubt.

4271. (*Mr. Harrison.*) Do you attribute the falling off of the fishery in any measure to the pollution of the river in this way ?—Most certainly. I do not think the fish can live in the river. I heard the other day of a man who put some gudgeons into an eel basket to attract eels and the gudgeons all died ; they had been there for only about two hours, they could not live in it ; that was in Reading.

4272. There is a considerable amount of fishing carried on, is there not, in the neighbourhood of Reading ?—Yes, for barbel and perch, and coarse fishing.

4273. If the river was put into a proper condition for navigation, proper depth of water maintained above your mill, the channel properly ballasted so as to keep down the level of the water in winter and to pass the floods more rapidly away from your mill, and the weir taken in hand by the Navigation Commissioners and maintained, should you then consider that you were so far benefited as a mill-owner that you would give up your old lock dues ?—I am prepared to do so at once if the Conservancy Board, or whatever body it may be, take the river in hand. If they will keep the weirs and locks in repair, I will give up the lock dues to-morrow.

4274. Would it, in your opinion, be desirable to take measures to prevent millers from lowering the water below a certain point ?—The millers cannot do so under the Acts of Parliament without the consent of the commissioners.

4275. You mean that they have no right to do so ?—They have not.

4276. Would it be possible or desirable, where there is a considerable length of mill race, to put a weir at the head of it to maintain the water at a certain level, say, low-water line, for the navigation ?—The millers consider that the mills are older than the navigation, and I do not think you will find any miller agree to that arrangement. As regards myself, it would not affect me.

4277. Such an arrangement would be a benefit to the millers in this way, that when they wanted to repair their mill they could let the water off for the length of their mill-race without emptying the whole of the pond ?—At present that is done in a very short time, and does not interfere with the navigation at all.

4278. I believe, as well as an old lock owner, you are also a bondholder ?—Yes, I am sorry to say I am.

4279. I believe you are one of those who have expressed a willingness to accept a small sum ?—Yes, anything that would be at all fair, a low sum was mentioned, 2*s*. in the pound, and, I, for one, should be ready to take that. We have found some difficulty, we old bondholders ; we do not all agree amongst ourselves.

4280. Would it be desirable in any new arrange-

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ments for the restoration of the navigation, that better security should be held out to future bondholders than that which was given to the present bondholders ?—I do not see how you could give us better security than the last.

4281. I daresay you have seen advertisements which have been issued by the Board of Trade in which it is proposed that the Thames Conservancy shall be empowered to levy a rate upon parishes and property abutting upon the Thames ?—I think they will meet with too much opposition to carry that, but that is only my opinion.

4282. If that were approved of, it would be sufficient security would it not ?—Yes, it would improve our bonds directly, I have no doubt, very considerably.

4283. (*Professor Way.*) If any legislation takes place, or any attempt is made to put the navigation in the hands of the Thames Conservancy is it likely the bonds will be sold at 10*s*. per cent.?—My own opinion is, that there would be no great difficulty in making an arrangement with the bondholders at that amount. We have been without any interest for our bonds for the last two years.

4284. (*Mr. Harrison.*) Have you at all considered what provision should be made for the future management of the Thames ?—I am quite satisfied of one thing, that the present system cannot go on. Everything is out of repair all the way down, nothing has been well done ; all that has been done for years has been patchwork.

4285. Does the formation of that eyott just under that bridge affect your mill tail in a flood ?—Yes, the arches of the bridge were intended to pass the water.

4286. And now by the growing up of this eyott your water is throttled ?—Yes, it cannot get out so freely.

4287. And consequently it tails back against your mill weir ?—No, the bridge is on the barge river, where the waste water runs through in time of flood, that waste water requires all the vent we can give it, but it cannot pass through the arches that are filled up.

4288. Do you see any way in which good security could be given for the money that is required for the restoration of the Thames ?—I cannot say that I do.

4289. What is the charge per ton for goods from Sonning to London ?—The tonnage was 8*s*. ; it would be 6*s*. 8*d*. now, that is for heavy goods ; mine are all heavy goods, wheat and flour.

4290. What towns are situated upon the Thames below you, and which are so far from the railways, that the river navigation would be a decided advantage to them ?—The Thames Commissioners, as you are probably aware, objected to the Great Western Company passing at all ; they were instrumental in throwing out a bill for that purpose, and on that occasion they gave Mr. Payne, their clerk, a piece of plate, at Salt Hill. They have kept the railway as far away from the Thames as they could.

4291. Are there a considerable number of places situated so far from railways that the restoration of the river navigation would be important to them ?—No doubt it would be very important to the millers to have the option of sending either way ; of course in floods and frosts the traffic would go by railway.

4292. Such towns, for instance, as Great Marlow, and some others ; how far is Great Marlow from the railway ?—About three miles off.

4293. Wherever the river is close to a town there the navigation is very important ?—No doubt.

4294. (*Professor Way.*) You think that there would be a considerable local passenger traffic on the river ?—During the summer months I think a steam boat might work for pleasure excursions, but running from Sonning to London would involve being out one night, and that is a difficulty.

4295. You spoke just now of the annoyance you experienced at your mill from the sewage, did you mean there had been accumulation of sewage matter about the paddles of the wheel ?—I spoke of the general smell of the river. There are no houses on the river between Reading and my mill.

4296. Does the smell arise from an obstruction being offered to the passage of the material at your mill ?—At certain times ; for instance, in the spring, just as a flood commences, when there is just enough water to stir this matter up a little, then we get the smell very bad, it is very offensive at the mill, and even in my garden.

4297. (*Mr. Harrison.*) What head of water have you now, when your power is reduced to 10-horse power ?—The head of water has not risen in proportion, because the weir takes it off ; we are obliged to keep the water at the weir as near as we can to high-water mark.

4298. What difference is there between the level of the upper and lower reach ?—Not more than 2 feet 6 inches now.

4299. Instead of 4 feet 1 inch ?—Yes.

4300. (*Chairman.*) Have the Commissioners power to prevent that accumulation which you have spoken of under the arches of the bridge ?—I should think so, they ought to have at all events.

4301. (*Professor Way.*) They have power perhaps, if they had the money, is that what you mean ?—No doubt of it.

4302. I suppose you are aware that if you, as a member of the commission, now order any work to be done and there are not funds to pay for it, if you form part of that committee you will be liable for the expenditure ?—That is the purport of the opinion which we have obtained from counsel.

4303. Do you think that is an effectual barrier to your attempting to order work to be done without having money in hand ?—Of course it is.

4304. Would your absenting yourself from the committee meeting exonerate you from the liability ?—I apprehend not.

4305. (*Chairman.*) If left as you are, without any interference, will matters get worse ?—Yes, they must get worse.

4306. (*Professor Way.*) Your cry is for action ?—For some prudent management. Unfortunately there is no money, and a great number of the Commissioners have no direct interest in the Thames ; there are only one or two bondholders amongst all the committee men, so that the thing has been left uncared for. Take the case of the Great Western Railway, and suppose that the Provost of Eton, and every clergyman living on the line, had power to go and manage that railway, you would soon find, I think, that things would go wrong.

The witness withdrew.

Mr. W. E. Saker (of Shiplake Mills) examined.

Mr. W. E. Saker.

4307. (*Chairman.*) Do you agree with Mr. Witherington that the river is more full of mud than it was some years since ?—Decidedly.

4308. And that it is made fuller by the additional volume of sewage that is passed into it above ?—I should suppose so ; I do not know any other cause for it.

4309. Do flood waters cause you any annoyance ?—Yes, very considerable annoyance, and much more than they can Mr. Witherington. Flood waters annoy me in consequence of there being so much less outlet from the head to the tail of the mill below me, to what there is at my mill. Mr. Witherington knows perfectly well, that at my mill in addition to the usual outlets of the old lock and the navigation water at our present lock gates, we have the two channels from the Thames to the Loddon with four feet fall. Of those additional outlets I do not complain, although they subtract from my power considerably. I think they are very beneficial to the river, and that they should remain ; if there was a similar outlet in the reach below, it would benefit the river and me too.

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My head of water is not one half now its proper height in consequence of the flood water.

4310. You think that you should all be put on the same footing?—Yes, the complaint that I have to make of these outlets from the Thames to the Loddon, is simply in connection with the navigation in summer time. I wish to remark that there is a railway bridge at Shiplake, a wooden one upon piles; such a bridge in a river must be a considerable obstruction to the navigation. I complained of that, and I had a great deal of negotiation with the company upon the subject, they went a cheap way to work, and I believe the bridge must be remade now. If instead of a piled bridge, there was to be an arch thrown across the river, it would be a considerable benefit to the navigation. In flood water we find constantly weeds and things of that kind get round the piles, and obstruct the flow of the water.

4311. You think that the railway company have not given waterway necessary for the free escape of the water in times of flood?—Certainly not, the bridge is at the very narrowest gauge of the river, immediately below the entrance of the Loddon.

4312. What proportion of the sectional area do those piles take up?—Not so much, they divide the stream into three, but it must be remembered that a pile is more hindrance than its cubical contents represent; if those piles were placed together at the side of the river they would not cause one half the obstruction that they do from being placed singly across the stream.

4313. They throw the water into eddies?—Yes.

4314. And prevent its going away with its natural velocity?—Yes.

4315. (*Mr. Harrison.*) Generally speaking, the velocity of the water is not so great at the sides as in the centre of a river?—No.

4316. The piles would be in a less objectionable place at the sides than as they are now in the centre of the river?—Yes.

The witness withdrew.

Mr. W. H. Cutler.

Mr. W. H. Cutler (of Windsor) examined.

4317. (*Chairman.*) Are you the proprietor of the Windsor waterworks?—Yes.

4318. How is the water obtained?—Out of wells.

4319. Have you any parliamentary powers?—No.

4320. How long is it since the works were established?—About 200 years ago.

4321. Have you acquired them by purchase?—Before my time my great uncle bought up the shares that he did not already possess.

4322. Where are the wells situate?—On an island, Tangier Island.

4323. What power do you use for raising the water?—Partly water power and partly steam.

4324. What is your water power?—Between 15 and 16-horse.

4325. And steam-power?—It is a 12-horse engine, but it is worked up to a great deal more than its nominal power.

4326. It is a high-pressure engine?—Yes.

4327. Is the water forced into a service reservoir, or do you lift it by a stand-pipe?—It is forced into the mains, and overflows at the highest point; that is a safety valve for it.

4328. What volume of water do you pump per day?—About 300,000 gallons into Windsor. The whole quantity that we pump is about 440,000 gallons per day in the 24 hours; we pump day and night.

4329. Do you pay any rental for taking that water?—No, it is pumped out of my own wells, and the water comes out of my own stream.

4330. Is your island upon the river Thames?—No; the island where these wells are is surrounded by two streams, one entirely belongs to me, and the other, I imagine, belongs half to me and half to other riparian proprietors.

4331. Do you know where the waterworks for the supply of the castle are?—I do.

4332. How far distant from yours?—They are just on the opposite side of the river, or a little bit lower down.

4333. Is the water pumped from wells there?—Yes.

4334. Do your wells differ from those wells?—I have not examined their wells, but I think their wells are made of brick; mine are constructed of iron.

4335. To what depth do your wells go into the subsoil?—I have three wells, and they are at different depths. One well is only 20 feet deep from the ground level, another is 60 feet deep, and a third 30 feet deep. This I have sunk within the last few months.

4336. What is their diameter?—The diameter of one is 6 feet, of another 5 feet 3 inches, and the largest one is a little over 8 feet.

4337. Do all of these wells end in gravel?—No, there is chalk at the bottom of each of them.

4338. Is there any bore-hole in continuation into the chalk?—The 60-feet well is partly a bore-hole, a 12-inch bore.

4339. Are there bore-holes in the other wells?—No.

4340. Do you find that the water in those wells is at all effected by the water of the river?—If I was not pumping out, the water would be at about the same height in the well as in the river.

4341. Is there any other source of public supply to Windsor besides yours?—No. I supply pretty nearly all Windsor except the castle.

4342. And also the stables?—No. I supply the cloisters of the castle.

4343. Do you supply the barracks?—Yes, both for horse and foot soldiers.

4344. Is the supply exclusively private?—Yes.

4345. Have you any returns to make as to your income or expenditure or anything?—Only to the income-tax collector. I have not to account to anybody.

4346. Do you sell to the large consumers by meter or by special arrangement?—By special arrangement. I would sooner supply by meter.

4347. Do you supply any persons in that way?—Only the barracks.

4348. Do you supply the railways with water?—The Great Western Company by private arrangement, but not the South Western Company.

4349. What do you charge the barracks supplied by meter per 1000 gallons?—8½*d.*

4350. What is your usual charge upon the towns?—1*s.* in the pound upon the rack rental, and a small charge for waterclosets.

4351. Do you publish a scale of your charges?—There has been one published, but I have not got a copy of it now. The charge for a watercloset is from 4*s.* 6*d.* to 2*s.* 6*d.*, according to the size of the house, but a great many small tenements are supplied at the rate of 2*d.* a week. There are over 300 small tenements so supplied now.

4352. Is the supply constant?—Yes, except that I have no reservoir. I have to stop now and then; supposing that something breaks in the waterwheel, I have to get up steam. Sometimes there is sufficient water by using the waterwheel without the steam.

4353. Is there any fire service on the mains?—There are fire plugs.

4354. Would any charge be made for the use of water in case of fire?—No.

4355. Do you make any separate charge for watering the streets and flushing the sewers?—Water for that purpose is supplied to the board of health at the rate of 6*d.* per 1000 gallons.

4356. Is that by meter?—Yes, partly. There is a stand pipe with a meter near the Town Hall.

4357. Has there been any proposition made on the

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part of the town authorities to purchase the works from you ?—No proposition has been made to me.

4358. Suppose they wished to purchase the works, would you be inclined to dispose of them or not ?—That would depend upon what price I could get. They are rather a hobby of mine, and I have spent a great deal more money upon them than I ought to have done if I had considered the dividend that I was to receive.

4359. Is it a fair question to ask you what they are worth per annum ?—Yes, but I should have some little difficulty in giving you a correct notion, because since I have held them there has been so much money laid out to put them into an efficient state. Before I took to them, about 10 years ago, they had been managed by a guardian and were in a very bad state indeed.

4360. You have had, I imagine, to change the character of the main. Do you know what the first mains that were laid down consisted of ?—They were wooden; and sometimes in laying down a new main we come to an old wooden pipe which has not been removed.

4361. When did you lay down cast-iron mains ?—I do not know.

4362. What is the kind of joint that you are using now ?—The joint is caulked with a gasket and then lead is run in.

4363. It is what is called a spigot and faucet joint ?—Yes.

4364. Did they in the first instance use any flange joints ?—I use flange pipes for the suction pipes, not for the mains.

4365. Were they ever used for the mains ?—No, I have never come upon any.

4366. What is the diameter of your largest main ?—The largest main is 9 inches, but there is a 6-inch main running by the side of it.

4367. Do you pump directly into both of them ?—Yes.

4368. Those mains of course serve for the supply as well ?—Yes; the service pipes branch away from the mains.

4369. Have you any difficulty at the wheel or the engine by the use of the water in the main ?—Yes. The waterwheel would be better with a governor. If a large quantity of water is suddenly taken out of the main for flushing the sewers at Eton, the waterwheel will start off at a tremendous pace.

4370. And it is pulled up when they shut the water off ?—Yes.

4371. Do you know anything about the condition of the river opposite your works. Is it better or worse than it used to be ?—Most decidedly worse.

4372. In what way ?—As more requiring repairs.

4373. Have you a weir or any work upon the river to back the water up ?—There is a weir at Windsor, but it does not belong to me.

4374. Although you get water power you are put to no cost in maintaining the weir ?—I am put to a small cost in maintaining the weir now, because nobody but myself does anything to it. I do a little to it for my own interest.

4375. (*Mr. Harrison.*) To whom does it belong ?—To the Thames Commissioners.

4376. (*Chairman.*) Are you a commissioner ?—Yes.

4377. Do you act at all ?—I have attended some of the meetings.

4378. (*Mr. Harrison.*) Is that the weir which keeps up the water for the Castle Waterworks ?—Yes.

4379. (*Chairman.*) Have any complaints been made as to the scarcity of the water from your works, or are you capable at all times of supplying all that is required ?—I am capable of supplying a great deal more than is required.

4380. Should you find any difficulty in increasing that supply if it were found necessary ?—Not any.

4381. Should you then want additional steam power or additional water power ?—I would sooner put down additional water power. I am not quite clear whether I should be allowed to do so, but if I was I could very easily get more water power by making a cutting across the island and putting a wheel on the island. I should then get a good fall of water of about 4 feet 2 inches in the summer. I should prefer that to steam, for as the engine would have to work day and night the men must stop up all night to look after it, and I do not like that.

4382. Are you troubled in a severe winter with the frost ?—A severe frost causes a main to burst occasionally. The wheels do not get stopped, for braziers are kept burning in the wheel house.

4383. Is there anything further that you wish to add to your evidence ?—I have a mill besides the wheel that works pumps—a corn mill also.

4384. Upon the same site ?—It is not on the same stream. The mill is let.

4385. (*Mr. Harrison.*) Are the mill and the wheel for the waterworks worked from the same head ?—Yes.

4386. (*Chairman.*) You could, if you liked, convert the stream which now turns the mill, into pumping power ?—Yes; but I would sooner put up another wheel, because there is plenty of water running to waste, and it might be as well used as run over the weir.

4387. What is the rental of that corn mill ?—It has been let for only 130*l.* a year, but then I have the power of using the waterwheel for 12 hours out of each 24 hours to work a set of pumps at the side of the mill.

4388. (*Mr. Harrison.*) What kind of a weir is it that keeps up your head ?—A wooden weir.

4389. Can it be taken up ?—Yes; there are sluices to pull up or paddles.

4390. It is not a fixed weir and a tumbling bay ?—Part of it, to the extent of about a third of its length, is a tumbling bay.

4391. How long has that weir been erected there ?—About 50 or 60 years.

[Mr. Cutler's further examination will be found in the notes of the next day.]

The witness withdrew.

Mr. THOMAS INGRAM (of Windsor) examined.

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4392. (*Chairman.*) Are you connected with the Royal Gardens ?—I am, and have been for 20 years.

4393. Do you know much of the river Thames where it flows past Windsor ?—Yes; I have known it ever since I was a boy.

4394. Is any of the royal property flooded by the Thames ?—Yes, a great deal; the lower part of the Home Park.

4395. Do you know the situation of the main outlet sewers from Windsor and from the castle ?—Yes, perfectly well.

4396. They come through a part of the Home Park, do they not ?—Yes.

4397. Is any part of the sewage of the town sewer at any time thrown over the surface of the park by flooding ?—Yes, very much so.

4398. Does that cause any nuisance ?—Yes, a very great nuisance.

4399. Do you suffer any nuisance there from foul smells ?—If the wind sets into the Home Park, we do.

4400. Is that where the Queen's drive is ?—Yes, the drive comes past the outlet of the sewer. Her Majesty frequently passes that way.

4401. In dry weather is that a cause of nuisance ?—It is a great nuisance.

4402. From the smell of the sewage ?—Yes, particularly if they are flushing the town.

4403. Have you any control over that sewer ?—No.

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4404. Are any persons appointed to cleanse it?—Yes, it is well attended to in that respect.

4405. Still you find it a nuisance in dry weather from the smell, and in floods from refuse being thrown out on the surface of the park?—Decidedly so; in hot weather you may see the water between Albert bridge and the sewer entirely covered with oily matter.

4406. From the sewage?—Yes, at about the distance of 300 yards from the sewer to the bridge.

4407. Do you remember the condition of the Cranborne Ditch before the formation of that great sewer?—Yes.

4408. Is it better or worse now than it was formerly?—It is much better.

4409. Did the sewage of Windsor come down into that channel before the great sewer was made?—Part of it, not all; I perfectly recollect that it floated through there, nearer to the Long Walk, and it came near to the outlet of the present sewer.

4410. From the town of Windsor?—Yes, from part of the town.

4411. Was it in a foul condition then?—Yes, very foul indeed.

4412. I believe there has been some alteration made in the sewerage of the castle?—Yes, there was last year.

4413. Has that tended to the improvement of the river?—Nothing whatever.

4414. Is the castle sewage kept out of that great sewer?—Yes, it is shut off entirely, and passes into the river above the great sewer by a channel of its own.

4415. (*Mr. Harrison.*) You have stated that the new sewer has lessened the nuisance very much, as compared with what it was when the Cranborne was opened?—Yes.

4416. By whom was that sewer put in?—By the Crown—that part of it which passes through the royal domain.

4417. At the expense of the Crown?—Yes.

4418. Right to the outlet?—Yes.

4419. Who takes care of it now?—Mr. Morris.

4420. (*Chairman.*) Who pays that sewerman that was here yesterday?—The Commissioners of Land Revenue.

4421. He is a Crown servant exclusively?—Yes.

4422. (*Mr. Harrison.*) I believe your father made some alterations in the banks of the river along by the park?—Yes.

4423. You can give us a description of the works which he carried out?—Yes, the banks were in a very rough state, similar to what the banks of the Thames now in other parts are, some portions being very high and some very low; the higher portions he bevilled off, and used the soil to fill up the hollows. By these means he made a uniform bank between the two bridges which extends for about a mile.

4424. How did he secure the toe of that bank?—Where the ground was solid it was bevilled off and well rammed and turfed; the turf was secured by pegs at the water-line, and it took root.

4425. Where the ground was not solid what did he do?—He used sods and stakes.

4426. Was there any camp shedding?—There was camp shedding near Victoria bridge; the water washed a great part of the land away adjoining the park.

4427. Is it on that sharp turn below Victoria bridge?—Yes.

4428. There you put the camp shedding?—Yes, and we brought the current to join the bank, I suppose, for about 200 yards.

4429. Can you give the Commissioners any account of the expense of the alterations that were made?—No, our men did it in their usual work.

4430. You cannot give an estimate of what the expense of sloping down the bank in that way again would be at per yard?—I might find it out and give it to you afterwards.

4431. (*Chairman.*) How long is it since it was done?—14 years.

4432. Has it required much repairing since that time?—No, it is as good now as it was; it requires mowing twice a year.

4433. Are there other parts of the Thames which you think might be improved in a similar manner?—Yes, decidedly; and with advantage too; it would beautify the river very much.

4434. With regard to floods, do you think that you could keep them off by embanking the Thames and raising the banks on either side?—I think not; the water percolates through the park so very rapidly.

4435. (*Mr. Harrison.*) What is the subsoil?—Gravel down to the chalk.

4436. Have you observed the effect of the water in the river at different levels below the surface of the meadow adjoining?—Yes.

4437. At what height do you think water standing in the river below the land is most advantageous to the turf?—From 9 inches to 1 foot.

4438. (*Professor Way.*) At all times of the year?—In dry weather you would want it nearer the surface.

4439. (*Mr. Harrison.*) Did you hear Mr. Witherington give his evidence?—No.

4440. He stated that he should like for his meadows to keep the water at a good depth below the grass?—It would be according to the soil, perhaps.

4441. At what level below the grass would it be desirable to keep the water?—I cannot say.

4442. (*Chairman.*) Do you know anything of the sewerage of Frogmore House?—The sewerage of Frogmore goes into the main sewer, but we use it all at the gardens, in what we call the kitchen garden.

4443. Do you use all the sewage there?—Yes, all of it.

4444. Do you pump it?—We pump it from the cesspools and use the liquid for the vines and the asparagus; the solid matter when taken out is mixed with ashes and spread on the ground.

4445. Do you think the castle sewage might be dealt with in any way upon that land?—Decidedly so, if it were not diluted with so much flushing.

4446. Have you suffered inconvenience in flood times from the water backing up from the Thames into the Royal Gardens?—Yes, but that does very little harm; the water gets into the stoke holes during high floods.

4447. (*Mr. Harrison.*) How far from Frogmore is that part of the meadow upon which the sewage rises in floods?—About 400 yards.

4448. When the sewage is upon the land is it a nuisance?—When it is upon the land it is, particularly so when it is on the next field but one to the royal dairy, and likewise when it is upon a field which is called the Thames field.

4449. (*Chairman.*) Do the floods ever get into the carriage drives?—Yes, and we have had to employ men to scrape the refuse off sometimes two inches in depth.

4450. (*Mr. Harrison.*) What was the character of the stuff that was removed?—Below the sewer it had a great deal of sewage matter mixed with it.

4451. In powder?—Yes.

4452. (*Chairman.*) Does the solid matter that is brought down by the main sewer lodge at all in the river—in the reach below you and below the sewer's mouth?—Very little.

4453. Does it not form any bank?—No.

4454. Not down below?—It may below, but I am not aware of any bank being formed. I went over the river this morning on purpose to see. The sewage lodges against the bank when the water rises and falls; it does not lodge otherwise.

4455. It lodges, then, and you have to cleanse it off?—Yes.

4456. Have you noticed carcases of dead animals floating down the river?—Yes, plenty of them.

4457. Do they cause you any annoyance?—Yes, sometimes they do, when they lodge in the eyotts or osier beds.

4458. Do you leave them there?—No, we push them off into the river.

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4459. They are not buried ?—No ; there is a great fall in the Thames just there, and they are carried down.

4460. Is the bridge just below you called the Albert bridge ?—Yes.

4461. Is that a railway bridge ?—No.

4462. How long has it been built ?—It was built about 1851.

4463. Does it impede the flow of the water down the river ?—No ; it is an improvement upon the old Datchet bridge, which was midway between the two bridges that now exist.

4464. Is the character of the river better or worse than when you first knew it ?—In some parts better, and in some much worse.

4465. In what respect is it worse ?—From the decaying of the locks and weirs.

4466. What is the character of the water in dry weather, is it worse or better than it was ?—I see very little difference above the sewer.

4467. But below the great sewer, do you find that the sewer causes a nuisance ?—Yes, a very great nuisance.

4468. Of course that will be in proportion to the length of the drought ?—Yes, exactly, and the height of the water.

4469. Had you much nuisance to complain of last summer ?—Yes, very much so ; the water was so low.

4470. Has the sewage any injurious effect upon the fish in that part of the river ?—I think they get fat upon sewage.

4471. It does not kill them ?—No.

4472. (*Professor Way.*) Are you speaking of fish that are valuable for eating ?—Perch.

4473. (*Chairman.*) What fish do you principally catch here ?—Perch, and roach, and dace.

4474. And eels ?—Sometimes eels.

4475. One sees occasionally punts moored for fishing, can any person fish there ?—Yes, but they must not land ; they may fish all day long.

4476. And you would not disturb them ?—No.

4477. Is there a towing-path there ?—Yes.

4478. Have you to maintain that ?—Yes, we maintain it, but it is no trouble or expense.

4479. Does it go through the park ?—Yes.

4480. Do you maintain the gates that are connected with it ?—No ; the Board of Works maintains them.

4481. (*Mr. Harrison.*) Are not men from the barges allowed to land when looking after their boats ?—Only when with their horses ; or in case of an accident to a barge.

4482. Supposing a party was rowing a boat up, and one got out with a rope to haul it up, might he do so ?—Yes, he might do that.

4483. (*Chairman.*) There are, I presume, park keepers to prevent any improper landing ?—Yes, and there are notice boards placed at different distances. The Thames Commissioners claim the use of 24 feet from the water's edge for a towing-path, and the barges pay a toll for the use of the paths. There is a toll paid from the entry at Bourne ditch to Swan's bridge of 9*d.* every barge.

4484. To whom is that paid ?—It is paid to the lock-keeper here, and it goes for the benefit of the farm. The previous tenant before the enclosure of this land received this 9*d.* per barge ; now Mr. Tait, the director of the farm, receives it.

4485. Is that the royal farm ?—Yes, and that paper shows what he has received in the last 10 years.

The same was handed in as follows :

“ 9*d.* per barge is paid for passing along the River “ Thames from Bourne ditch to Swan's bridge.

“ The amounts received per annum from 1854 to 1864 “ were as under :

	£	*s.*	*d.*
“ 1854	16	7	3
“ 1855	10	11	3
“ 1856	9	15	9
“ 1857	12	14	3
“ 1858	12	3	0
“ 1859	11	5	6
“ 1860	11	7	6
“ 1861	11	1	0
“ 1862	8	5	0
“ 1863	8	4	0
“ 1864	7	9	9

“ These sums are claimed by the servants of the Crown, “ and Mr. Tull, the Windsor lock-keeper, receives the “ payments.”

It is paid for passing along the river from Bourne ditch below Albert bridge to Swan's bridge, just above the sewer.

4486. (*Professor Way.*) Has it come within your knowledge that any experiments have been made to turn to account the solid matter of the sewage of the castle by filtration or otherwise ?—Some years ago I remember something being done.

4487. Was it successful ?—Yes, but in the end it was all abandoned.

4488. (*Chairman.*) Is there anything further that you wish to add to your evidence ?—I may mention that we have the osier beds now under our charge, and we have very much improved the river by making the banks by their side, and doing away with the old pollards that used to lie in the water.

4489. (*Mr. Harrison.*) Do you mean below Albert bridge ?—Between the two bridges. We pay a rent to the Commissioners of Land Revenue of 42*l.* 6*s.* a year for this.

4490. Who does ?—My father pays it on behalf of the Lord Steward. The osier beds belong to the Crown ; the rent is paid to the Woods and Forests. There used to be many boughs overhanging when the osier bed was rented by private individuals.

4491. Have you known the eyotts to increase at all ?—No. My father formed a bank likewise at the side of them.

4492. Just below Windsor bridge have you known these eyotts alter much ?—Yes, I have known them increase and decrease very much. There is a part down the river below old Windsor weir that has very much altered in my recollection.

4493. How far below the Windsor bridge is old Windsor weir ?—About two miles and a half.

4494. It is below Albert bridge ?—Yes, it is nearly a mile to the spot where I mean, which is just at the turn.

4495. (*Chairman.*) Were any encroachments made at Victoria bridge at any period that caused you to protect the banks there ?—Yes, very great encroachments, by the water washing the soil away from the Home Park side.

4496. Below the Datchett road ?—Yes. Just below the Victoria bridge, where the camp shedding is, there was a great space of ground to fill up when it was put in.

4497. And you carted the earth in ?—Yes.

4498. Have you found that that has really formed an efficient protection to the bank ?—Yes.

4499. If you had not put that there the damage would have gone on increasing ?—Yes, decidedly.

4500. And the land would have wasted away ?—Yes. By making a proper curve in this bank we find that the water does not wash it away.

4501. You have fendered it off ?—Yes.

4502. (*Mr. Harrison.*) The weir below, you call old Windsor weir ?—Yes.

4503. Was that weir erected by the Navigation Commissioners ?—Yes, it belongs to the Commissioners.

4504. Do you know how long it has been erected ?—A great many years. The locks were built in the reign of George the Third, and the weir was made some years later.

4505. In what condition is the weir now ?—It is in a very bad condition now.

4506. In what way do you say that it has a mischievous effect upon the river? —It turns the water so as to wash away the bank on one side and to drive the soil to the other.

4507. What encroachments have you observed at

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that sharp turn below old Windsor weir ?—Encroachments to the extent of about 20 yards.

4508. In what period of time ?—In about 18 years for about a quarter of a mile, forming a large osier bed, where in my recollection there was a little island in the midstream.

4509. Is that encroachment still going on ?—Yes.

4510. Has it been increased by the dilapidated state of the weir ?—The state of the weir has not made any difference.

The witness withdrew.

Mr. W. Menzies.

Mr. William Menzies examined.

4511. (*Chairman.*) What position do you hold in Windsor ?—Deputy surveyor of Windsor Park and Forest.

4512. How long have you acted in that capacity ?—16 years.

4513. Are you acquainted with the town and suburbs of Windsor ?—Yes, very well.

4514. Have you paid any attention to the sewerage of Windsor and Windsor Castle, and of the outlet of the sewers into the Thames ?—It is only within the last four years that the outlet has come specially under my own individual charge.

4515. You mean the outlet of the great Windsor sewer ?—Yes.

4516. When was that outlet made ?—About the year 1848.

4517. What property drains into that great sewer ?—From the Long Walk to the river Thames that main sewer acts in a composite character; it takes the whole sewage of the borough of Windsor, and the sewage of a good many buildings belonging to the Crown in the Home Park. It also acts as outlet for the land drainage and the surface water of a very large area of Crown property, and as outlet for the agricultural drainage of a good deal of land on either side of it as it passes through the Home Park.

4518. Is that main sewer entirely upon Crown property ?—Entirely from the Long Walk.

4519. Is it upon the site of a natural water course ?—Not exactly, it follows generally the line of an old watercourse called Cranbourne.

4520. Has it superseded that watercourse ?—To a great extent, but that watercourse comes into action in excessive floods by means of overflows.

4521. Do you know what area of land that brook drains ?—About 1500 acres.

4522. Do you know, roughly, the area upon which Windsor stands ?—It is not quite a square mile. The town proper is about 600 acres.

4523. Are there any inconveniences, in your mind, connected with making a natural watercourse the receiver of all the surface and subsoil water and all the sewage of a town ?—It is a very objectionable thing in any shape or way, and fundamentally wrong in principle.

4524. What volume of water may there be flowing through that sewer in very dry weather, in such a summer as last summer, for instance ?—The land water, that is, the drainage water from the land itself, then becomes nil; the Cranbourne is perfectly dry at the end of almost every summer.

4525. Is there a power of turning in water from the Thames at the head of the loop ?—They can turn in water there through an opening of 3 feet diameter; the water flows in a segment of a circle a foot deep at the lowest summer level.

4526. Which water they can pass down for flushing purposes ?—Yes.

4527. Do you know the capacity of that main outlet sewer ?—7 feet 6 inches deep by 5 feet 3 or 4 inches wide.

4528. During summer, if left to the ordinary flow from the land, it would, you say, be nothing ?—Nothing.

4529. In summer then the entire volume consists of sewage water and of the quantity of water that is let in from the river above to mix with it and carry it through ?—Yes, certainly.

4530. Is that sewer under the charge of a servant of the Crown, or under the local authorities ?—Under charge of a servant of the Crown, exclusively.

4531. Does it involve any cost to maintain and to cleanse ?—It costs a man's wages the whole year over to keep it in order, and to attend to it altogether; besides special expenses at other times for various purposes.

4532. Besides that, are the local authorities at any expense for flushing ?—No, they provide that for their own purposes in the town; they are at no expense whatever connected with that sewer; as soon as it enters the Crown property the Crown bears the whole expense of maintaining it and flushing it when there is water to flush it.

4533. (*Mr. Harrison.*) The flushing by the Crown servants is from Cranbourne, not from the river ?—From Cranbourne.

4534. Flushing from the river is done by the town?—Yes.

4535. (*Chairman.*) Does the entire volume of sewage pass direct into the Thames ?—Direct into the Thames.

4536. There are no means adopted of taking out the sediment ?—No, all that is taken away is the sand which the sewer-man removes all along the line, the sand that deposits on the bottom of the invert.

4537. During periods of flooding the surface is fouled by water from this great sewer ?—Yes.

4538. This is calculated to create a nuisance ?—A very great nuisance indeed.

4539. Have you noticed any nuisance in the river, when the river is low, from the vast mass of sewage going in ?—My attention was specially called to it in the dry autumn of 1864. I had to examine it then specially, in the second week of November; it is impossible for any place to have been in a filthier state than the river then was from the mouth of the sewer downwards, for I should think a mile. There was at the mouth of the sewer a bank of filth 4 or 5 feet deep, and all along the bed of the river there was a thick grey deposit lying at every place where it could possibly settle.

4540. Has that been a nuisance upon the Queen's drives ?—There is no question about that.

4541. Have you turned your attention in any way to the utilization of sewage ?—Yes, I have been obliged to do so in several cases.

4542. You have published a work on that question ?—Yes.

4543. I believe you have carried out works of application ?—Yes, in various large establishments on the Crown property; also in several colleges and asylums I have had to carry out sanitary arrangements in some shape or another.

4544. Will you name the places ?—At Lincoln Asylum they could not filter the sewage, and with the authority of the Commissioner I went there to construct a filter. At Wellington College I had to utilize the sewage upon the ground by some means or other, so as to prevent nuisance to people owning the stream below. At Feltham Reformatory I had to devise some means of rendering the sewage arrangements far less dangerous to the inmates of the reformatory than they were before. At Sandhurst I have carried out this summer a plan for the utilization of the college drainage, so far as I could carry it out upon the present system. Also in several buildings on the Crown property in the park I have carried out, as far as I could, different arrangements of the same kind; but the largest work which I have carried out from the beginning to the end upon the principle which I believe to be the right one, is at the large asylum at Broadmoor.

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4545. From your experience, do you think it is practicable to deal with the sewage of Windsor so that it should not be the great nuisance it is now?—No question about it. I have no fear about being able to devise a plan by which the nuisance here could be cured.

4546. You would prevent the surface water going into the same sewer with the sewage, and thereby reduce the sewage to its net volume, and so deal with it in some way or other?—I have not the slightest doubt about it.

4547. Have you seen any of the methods which have been adopted for precipitating the solids of sewage?—I may say I have seen them, but I have really paid very little attention to them, because I do not pretend to know much about the chemical management of sewage. I have turned my attention solely to working the matter out as an agricultural problem.

4548. If you had to deal with sewage in the most economical way you would contrive to get it on the land for agricultural purposes?—That is the only plan in which I would have any confidence.

4549. From your experience, do you think there is a fair prospect of sewage being used in that way so as to abate nuisance, and at the same time to return something proportionate to the cost?—I have not the slightest doubt about it.

4550. You would not anticipate any extravagant income?—Certainly not.

4551. But some moderate income?—It would depend upon the first cost of construction and the cost of maintenance, and the question would arise whether it would be necessary to keep the works up by a rate, or whether a profit could be returned to the town or community.

4552. Did you ever see the Edinburgh meadows?—Yes, I know them perfectly.

4553. Does what is done there cause a great nuisance in the district?—No, I do not think so.

4554. If rightly managed, might sewage be applied to a proper area of land without being a very serious nuisance to the district?—I do not see the slightest difficulty in it. At Broadmoor the irrigation is carried on within 200 yards of the asylum, and I am quite sure if there was the least nuisance or the least risk there I should have heard of it long before this time.

4555. Has it ever occurred to you that where sewage has been complained of as causing a nuisance, it very probably may have been the sewage of a cesspool which has become foul and putrid?—No doubt that is often the case.

4556. Fresh sewage that flows directly away from any place is not of that putrid character?—It is of a different character altogether. My experience of it is that for the first 2 or 3 days after it passes into the drains it may be a little disagreeable and pungent, but men may work in it and irrigate with it without the least injury to themselves; but after the second or third day it changes its character and becomes putrid, and then it is a source of danger.

4557. If it could be got in that innocuous state direct upon the land you have reason to think that there would not be any just ground of complaint at any moderate distance from it?—I should not allow the solid matter in the sewage to lie and decompose upon the surface more than I could possibly help. I would remove the solid matter by mechanical filtration or straining and use the effluent water for irrigation.

4558. Putting it upon land which would at once absorb it?—Yes, land both naturally fitted and specially prepared for it.

4559. What would you do with the solid part?—I would mix it with as much coal ashes as would absorb it without causing any nuisance or trouble.

4560. Would you anticipate any disagreeable smell from allowing that to accumulate a few days?—No, I should not, not in the way I should treat it.

4561. What kind of crop do you think would be most suitable to be grown on land to which sewage had been applied?—My own experience would lead me to take Italian rye grass for two years and at the end of the second year I should break the land up and take a crop of vegetables.

4562. Is Italian rye grass biennial?—Yes.

4563. So that it would last productively for two years?—Yes.

4564. You would then break up the land and take a root crop?—Yes.

4565. After that would you take to Italian rye grass directly again?—Yes.

4566. What weight of crop would be taken from an acre of ground under favourable circumstances by that process?—In some parts of the land at Broadmoor we got five very good crops of Italian rye grass this summer. I cannot say exactly what the weight per acre would be.

4567. What is the population at Broadmoor?—500 or 600 now, with a prospect of increasing to 1000.

4568. What do you do with the ground in the winter?—My arrangement for Broadmoor, where I was compelled to lay down a plan providing for summer and winter, was this—15 acres were appropriated for treatment with sewage. I laid the land into three plots. one plot is in cultivation for vegetables, one plot in one year old grass, and one plot in two year old grass. The two years old crop is left long towards the end of the second year. That long grass will be sufficient to keep the land porous to keep out the frost so as to take the water during the winter. That is the method I propose in order to get over the troublesome weather in winter.

4569. After the sewage has passed on and through that land what is the character of the water when it comes off?—Perfectly transparent.

4570. Is the water liable to corrupt again?—The stream into which the water passes away supplies a village immediately below with water, and if there had been anything wrong I should have heard of it. The effluent water is perfectly transparent and to all appearance perfectly pure. I might add this, that at Broadmoor, where I can do so, I bring the underground drainage of the land that receives the sewage to the surface again. The levels were favourable for this purpose, and I make the water in the summer time go through the process again a second time.

4571. You use the water twice over?—Yes, if I want it.

4572. Do you find any advantage from that second application?—Not very great. How much may be due to the manurial quality in the sewage, and how much to the application of water in summer, I can hardly say.

4573. The advantage of the first dressing with the true sewage is shown at once?—Yes.

4574. What is done with the grass, is it cut in the summer or is it grazed?—It is cut for milch cows.

4575. Has any of it been made into hay?—A little.

4576. Of what character is the hay?—Good enough to feed store beasts upon, and good enough to feed cows. It is not equal to first-rate meadow hay, it is inferior in quality.

4577. Does its inferiority consist in its coarseness?—In its deficiency, I should say, in sugar and fattening qualities. This deficiency comes from excessive rapidity of growth.

4578. Have you seen the third report of the sewage commission?—Yes.

4579. Have you read what is stated there with regard to the milk-producing qualities of sewage grown grass?—Yes.

4580. Do you think those statements are borne out by your own experience?—Yes, I know it is a most excellent material for producing milk.

4581. Has there been any stock kept upon that land at Broadmoor?—In the autumn of last year we had nearly 1 acre sown down; in April this year we had sown down between 3 and 4 more acres; and during the whole of this summer they have had 10 milch cows, a bull, and 2 or 3 horses, the whole of which have been kept on that piece of land.

4582. If that had been merely ordinary meadow grass of very good quality, how many acres must you

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have required to feed the same number of animals?—You would have wanted a little over an acre to each animal, taking any land about here.

4583. So that you must have had 13 or 14 acres?—Yes, and there was some hay made besides; they could not get through the grass fast enough.

4584. How would that land stand in productive power as compared with good ordinary meadow land, would it be two or three to one?—That land in itself was worth little or nothing, and now there is no meadow land about here that would keep such stock as that has done.

4585. Would you say it was three times as productive as land about here?—I should say so.

4586. From your knowledge of the subject do you think, if the corporation of Windsor turned their attention fairly to the question, something like analogous results might be obtained by applying the sewage of Windsor to a proper area of land?—I have no doubt about it at all.

4587. Is there land within a radius of four or five miles of Windsor where it could be usefully applied?—All along the banks of the Thames, both right and left, there are great tracts of land lying upon beds of Thames drift gravel, which is, in my opinion, the best land that could be possibly selected for the purpose.

4588. It would want no draining?—No.

4589. Have you ever seen the method of applying the sewage at Carlisle?—No.

4590. Or at Croydon?—No. I believe I followed myself somewhat the plan adopted at Carlisle, with this difference, that the carriers there are open over head; in practice myself I have made common drain pipes carriers, laying them along the surface so as to prevent as much escape of effluvia as possible, if there should be a risk of any, and I have let the drain pipes leak at every joint, so that in reality the water is never exposed to the air at any single point till it is immediately going on the land.

4591. Are you aware that at Rugby and at Watford and some other places, steam-power has been put up and an underground distribution made by cast-iron pipes over large areas, the application of the sewage to the land being by hose and jet?—Yes.

4592. Would you adopt that method?—No.

4593. Why not?—For a great many reasons. It is a very expensive method to begin with and then it is very troublesome to keep in repair. The hose and jet I consider about the worst system of distribution you could follow, because it sends the sewage all high in the air, and when you come to deal with vegetables, the idea of the sewage being showered down on the tops of the plants would set people against them. It is a very troublesome thing to look after in every way; everything is under pressure, which is a very objectionable thing.

4594. Would it or not require more labour to get the same volume of sewage on to the same area of land?—It would require a very great deal of labour because a man must always be standing with the hose in his hand, that would soon come to be a heavy expense.

4595. Working that hose over grass would of itself injure the grass would it not?—Yes, if you come to vegetables you can hardly do it; it knocks vegetables all to pieces.

4596. Have you found any difficulty in putting the sewage on sufficiently evenly by open carriers or by the drain pipe carriers which you have described, where the distribution has not been under pressure?—None at all.

4597. Have you seen the Worthing sewage works?—Yes.

4598. Do you know what they get per rod for their grass at Worthing?—No.

4599. Would you think 1*s.* a rod extravagant?—No, that is the price I generally reckon the grass is worth. That would be 8*l.* an acre.

4600. That would be tolerably profitable farming, would it not, if it were repeated four or five times during the 12 months?—There is no doubt about that. The drawback is the expense of working it in the winter when you are getting nothing.

4601. Maintaining the irrigation?—Yes.

4602. Seeing the consequences of passing all this sewage direct into a river, which not only serves as an ornament to the properties through which it passes, but is used for domestic water supply, do not you think, that if sewage can be utilized in this manner, people should be prohibited from passing sewage into the river in the way they are now allowed to do?—The sooner such a prohibition is enforced the better.

4603. Do you think the Crown authorities would offer any objection to this sewage being taken away from the river?—Quite the contrary. I think they would be only too glad to see some scheme devised that would remedy the evil.

4604. From your examination of the district, do you think the sewage could be removed in such a manner as not in any way to be injurious to the Crown property?—I have not the least doubt about the possibility of its being done some way or other, but I am not prepared at present to state in detail how I think it should be done.

4605. You think the sewage could be removed by some sort of conduit or carrier so as not to cause any nuisance or objection?—I have not the least doubt about it.

4606. Have you any doubt at all as to there being land in this neighbourhood, sufficient in area and proper in quality, upon which to place this sewage so as to get good crops and not cause any nuisance?—I have no doubt about it.

4607. Supposing persons along the banks of the Thames and other streams, having a moderate area of ground, were compelled to utilize their sewage in the way you represent you have done in some of those buildings which you have mentioned, do you think they would be placed in any difficulty?—Some of them might have to resort to pumping, but the generality of them might work by gravitation.

4608. Many persons at present, not having had actual experience as you have had of the value of sewage when applied to land, let their sewage run into the nearest ditch, or watercourse, or river. If such persons were compelled by law to keep it out of the ditch, might they not in some way or other place it upon land, supposing they had a garden, or field, or grass plot of extent equivalent to receive the volume of sewage to be passed away?—I have hardly ever seen a place where they could not manage it by some means or other.

4609. They could put the sewage where it would be useful in some degree or other?—Yes, provided they had a moderate area.

4610. Probably the sewage of a family of eight or nine people might be utilized on an area of ground not much larger than this room?—No doubt, with a little care and attention.

4611. And yet the sewage of that one family might cause a very great nuisance, if allowed to run into an open ditch, or small stream outside the boundary of the premises?—Yes, the case arises every day.

4612. The practice which you have adopted, is to separate as much as possible, if not altogether, surface water from true sewage water?—I have done so latterly, entirely.

4613. So that you may have your sewage in as portable and compact a form as possible?—Yes, and with as fixed a limit of dilution as possible.

4614. So that you may know what you have to deal with in wet weather, and in dry weather?—Yes, in wet weather, and in dry weather, and night and day.

4615. I assume that you would try to carry out that principle under any circumstances as much as possible?—I would do everything in my power to bring it about.

4616. You would endeavour to make the process economically profitable?—No doubt; and sanitary at the same time

4617. For instance, in the town of Windsor, where the whole of the surface water now mixes with the

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sewage water, may I assume you would attempt to cut off the surface water at all the points where it was practicable ?—I would.

4618. And you would pass the surface water into its natural outlet, the river ?—Either its natural outlet, the river, or into the old Cranbourne, on the other side of the hill, or into some natural watercourse.

4619. Though Windsor has been sewered in a special way, do you see any great barrier to that plan being carried out now ?—No, it is simply a question of cost. As far as I have seen hitherto I see no difficulty that could not be overcome with very little trouble.

4620. Do you know the principle upon which the metropolis has been dealt with, viz., by intercepting sewers ?—I know it in principle pretty well.

4621. Is that something like the principle you would adopt ?—No, I should not adopt that plan. I should carry the principle a good deal further than has been done there.

4622. At Broadmoor how is the surface water taken away from the roofs and yards and the surface of the ground adjoining the buildings ?—From the roofs it goes direct into a large rainwater tank for the supply of the laundry. From all the surface, from the airing yards, the court-yards, the ground in front of the buildings and the roads, the water goes by the shortest way to the nearest outlet, either into a pit or a ditch, or to any point where we could get it away.

4623. Did you devise a system of sewerage for the building as well as land drainage ?—I was in communication with the chairman of the council before the building was finished, and I begged him, whatever he did, not to do anything with the house drainage and the surface drainage that would prevent me afterwards separating the two when I came to plan the sewage works, because he told me that that business would be committed to me. Consequently, as the building went on, the sewage was kept entirely by itself, and nothing was done to the surface water until I took it in hand; then, of course, the plan was carried out of keeping the two distinct.

4624. You have one set of drains to remove the surface water, and another set of sewers to remove the sewage ?—Yes.

4625. What is the size of the largest sewer ?—1 foot in diameter.

4626. What is the size of the largest drain for removing the surface water ?—I do not think there is any drain above 6 inches.

4627. Have you surface channels that carry away the surface water ?—Yes, paved channels in the court-yards which carry away the surface water into a small gulley that passes out by the nearest road to the outlet.

4628. Supposing there were no drains or sewers in Windsor, and you had to devise a system of sewerage for the town, I take it that you would arrange to have surface channels and outlet drains to take away all the surface water into the nearest natural outlet ?—Yes.

4629. And that you would lay down a system of sewers and house drains of sufficient capacity to remove the sewage water proper to the point where you would utilize it ?—Yes, that is what I would aim at.

4630. Do you see any difficulty in doing that in Windsor ?—No, not as far as I have gone yet.

4631. Do you know what the main sewerage of Windsor has cost ?—I believe it has cost 4,000*l.* or 5,000*l.* to make the main drains; what the junctions cost I am not able to say. If the sewage and surface water had been kept separate from the first in such a town as Windsor, the main sewer of the town would not have cost above half what it did, because it is large enough now for a man to go through from end to end, which I believe is perfectly unnecessary, and the difference between making a sewer of 2 feet in diameter (which is quite big enough for the purpose of taking the sewage proper), and making one 4 or 5 feet in diameter, is very great indeed when it comes to a mile in length, especially when the sewer has to be laid 20 feet deep in some places.

4632. What did your Broadmoor scheme cost ?—It would be very difficult to tell, because some was done by the builder as part of his original contract, then a good deal (the digging for instance) was done by convict labour, and a good deal was done in a mixed manner by the staff attached to the building I know pretty well what it cost after the sewage came to the point where I commenced to deal with it by filtration and irrigation, and so on.

4633. Taking some of the most favourable land upon the banks of the Thames within two or three miles of this place, how much per acre would it cost to adapt that land for irrigation ?—A good deal would depend upon the natural shape of the ground.

4634. Supposing you take a plot of 100 acres with a tolerably level surface and a subsoil not requiring draining, and you simply have to put your surface carriers over it, how much would it cost per acre? Would it cost 10*l.* or 15*l.*—I was going to say 10*l.*

4635. You would have roads to form ?—Assuming that the roads were all made, I should think 10*l.* ought to do it.

4636. Would you break the land up into squares or divisions by deep trenches, so as to get the water to it at short intervals, or how ?—I would construct carriers all along the highest points, making the most of all the natural falls, so as to keep the water as high as I could at every point; then from those I should make the perpendicular travelling channels. Whether I should use draining tiles in them or not to prevent the escape of effluvia I can hardly say.

4637. (*Mr. Harrison.*) What is the area of the roofing of the buildings at Broadmoor ?—17 acres.

4438. Is the water from the whole of that area collected by a tank ?—Yes.

4639. What is the size of that tank ?—

4640. What quantity of water a day does it supply for the use of the establishment ?—

4641. Is there ever any overflow from it ?—I do not think there ever is.

4642. Have you the management of any extent of land under the Crown ?—Yes, about 15,000 acres for the Office of Woods.

4643. Has any of that been drained under your direction ?—Nearly the whole that could be drained has directly or indirectly been drained under my charge.

4644. To what extent would that be ?—Somewhere about 3,000 acres.

4645. In what formation is that ?—The lower part of the ground is all upon the true London clay; the upper parts are upon the Bagshot formation—the middle and the lower bed.

4646. What is the subsoil there ?—It varies very much. In the lower Bagshot beds it is almost pure white sand; what I would call running sand.

4647. Does it pass the water freely through it ?—No, it does not.

4648. How is the surface of the land as to wetness ? There is generally a bed of iron rust about a foot down from the surface; if that is not broken the water lies in it the same as it would in a dish, and cannot get down at all. Then, if that is broken, and there is no drain made, wet falling simply creates a puddle lower down.

4649. So that, though it is sandy and gravelly, it requires considerable drainage ?—There is no doubt about it.

4650. Before you drained it what became of the water that fell from the heavens ?—It used to ooze out, and was given off in evaporation.

4651. Was a large proportion carried off into the adjoining stream ?—Of course a great proportion of it got into the adjoining streams, but a great quantity went off by evaporation.

4652. By your drainage in the Bagshot sand, do you bring more or less water into the adjoining streams than before ?—I bring more into the streams than before I drained it.

4653. Is that in large quantities at a time during

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floods, or is it spread over the whole year?—It comes in a more regular supply.

4654. So that you think by the drainage of Bagshot sands you have given to the rivers adjoining into which it flows a steadier supply and a larger supply than there was before?—Yes.

4655. How is that with respect to the London clay drainage?—The effect of the drainage upon the London clay is this, that it moderates the floods in the same manner, because before drainage, after the clay land had received a good deal of rain, as it has this autumn, it would not take any more in at all—it would get perfectly impervious to water. Then, if a great glut of rain came shortly afterwards, the water would come down with a tremendous rush, and of course would create a flood, because a flood never arises in the river till after a good deal of regular rain preceding a heavy fall. But by draining the land you create a spongy soil which moderates the pace at which the water flows off, and causes its discharge to be much more regular. Clay land, which has no water in it at all except what falls from the heavens, will, if it is drained, continue to give off water for weeks after the rain has ceased. The water must have been stored up all that time in this sponge of earth.

4656. After the ground is thoroughly saturated, and the drains are carrying off as much as they can, do you find in heavy rains that the water runs off the surface as well as from the drain pipes?—It might in exceptional cases, where the slope was very quick and the land was covered with grass.

4657. In such a case would you not probably have with drained land a larger discharge following continuous and heavy rains, the land becoming saturated with water, the drain pipes discharging as much as they can, and the water flowing from the surface at the same time?—You mean a quicker discharge. I have not thought of that.

4658. Do you think a larger quantity of water passes in a short time during floods into the rivers from land that has been drained than before it was drained?—No; I think the discharge from the land lasts over a much longer time.

4659. How does that agree with what is said to take place now in the river—namely, that the flood water comes down more rapidly by one, two, or three days than it did before the land was drained?—If the drains are surface drains, of course they will send it down into the river much quicker, but underground drainage seems to me to interpose a sponge between the rainfall and the river.

4660. After the dry weather in September we had a considerable quantity of rain in October; did you observe the flow from the drains then?—Yes; I was quite surprised to see that it was so small.

4661. Showing that the ground was thoroughly dried for a considerable depth, and that a considerable quantity of water was required to saturate it?—Yes.

4662. Of what character as regards drinking purposes is the water in the sands which you drained?—Where you can get it out of pure white sand it is very good and very pure, but where it comes from some of the beds of the oxide of iron that exists amongst the sand it comes out perfectly red and quite useless. Virginia water, for instance, would be totally undrinkable, because the water which comes down from Sunning Hill Bog is very highly charged with this oxide of iron.

4663. Is that the character of the water in the Bagshot Heath sand to any great extent?—Yes, there are a great many streams in the sand in which that state of things exists, but at the same time there are a great many that flow out of the pure white sand of which the water is exceedingly good.

4664. (*Chairman.*) If you had a district to sewer and drain, take, for instance, Oxford and its suburbs, where the water is absolutely upon the surface now, what depth would you like to reduce the water to, so as to be of the most benefit to the grass?—If I was to be master of the water I should like to bring it up pretty near the surface in the height of summer; but if the water was to be master of me, and to be there always, I should keep it down at 4 or 5 feet.

4665. (*Professor Way.*) Therefore what was stated by another witness as being most useful, viz., 9 inches to 3 feet, would meet your view?—Yes.

4666. A sliding scale in fact?—Yes, if it could be done; but I cannot conceive such a state of matters; therefore I should prefer to have the water down.

4667. You would not like to have it within 9 inches all the year round?—Certainly not.

4668. You said that you should take means for separating the solid from the liquid part of the sewage before applying it to the land; did that have reference to the mere grit and silt or to the whole of the suspended matter?—The whole of the suspended matter; according to the system which I should like to work upon there would be no grit in it.

4669. Therefore it would have reference to suspended organic matter?—Yes.

4670. By what means would you hope to effect that separation?—By upward filtration, putting the sewage into a tank with a downcast wall, and making it pass under the wall; the liquid rises to its own level, leaving the solid matter underneath.

4671. Without the use of any precipitant?—Without the use of any precipitant.

4672. Are you aware that, even with the aid of a precipitant, separation is found to be exceedingly difficult by filtration, and indeed almost impracticable?—I only attempt mechanical filtration; it is simply a question of the density of the materials through which you filter; you may separate sewage till it is as manageable as pure water.

4673. In your case you are dealing with suspended organic matter without silt, that would be more or less of the same weight as the water itself. I ask you whether you think it would be practicable to filter large quantities of such liquid mechanically?—I do not think there would be the slightest difficulty in taking out all the solid matter that is suspended. I don't think it is possible to take it out so as to render the water that has passed away perfectly pure, that is to say, free from ammonia and all the different things which decompose and create a nuisance.

4674. Do you apprehend that any difficulty would arise from that solid matter remaining in the sewage?—Yes.

4675. Are you aware that at this moment in such towns as Croydon and Carlisle the whole of the sewage, without any treatment at all, passes on, and yet no difficulty has been found in dealing with it?—It may be so, but it would be better the other way.

4676. You would like to separate the heavier matter?—Yes.

4677. That is attended with a great increase of expense, is it not?—Yes, no doubt; but you gain a great many counter-balancing advantages.

4678. You said something about the absence of profit from the use of sewage in winter as being a drawback to the advantage of its use; are we to take it for granted that grasses, for instance, do not grow either above ground or in their roots during winter?—If it was solid manure that you were putting on the ground, then winter would be a very good season in which to put it on: but when you come to irrigate the land, you may do just as much harm by over flooding the land as you do good by supplying grass with something that contains manure in it.

4679. Has not the temperature of the water some influence on the grass?—I do not see much good in forcing grass to grow in winter. I should like vegetation to lie perfectly dormant during the winter months; there is no benefit in its coming on too early, to be nipped by spring frosts.

4680. Does that apply to crops generally, or to grasses only?—To almost all crops.

4681. Is grass injured by frost in spring?—It is not benefited by it.

4682. (*Mr. Harrison.*) Are you aware that in different parts of Devonshire irrigation with pure

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water is carried on to a great extent in winter?—It is a very different climate in Devonshire to what it is in our part of England.

4683. (*Professor Way.*) Is it not the case that we want more than they that heat which we get from water?—I do not know; but the attempt to water meadows in this neighbourhood has ended in failure.

4684. But if, instead of using pure water, the temperature of which would probably be low, sewage water were used, the temperature of which would be between 60° and 70° all the year round, would not that be beneficial to the grass in winter?—Taking the expenses of pumping and all the expenses of working, as a commercial question, I have doubts whether applying sewage to the land in winter is a remunerative process.

4685. (*Mr. Harrison.*) If sewage were applied in winter, the manure contained in it would be left in the land, would it not?—If it is embodied in the water it is very doubtful. Irrigation must be applied to growing crops to do the greatest amount of good.

4686. (*Professor Way.*) Supposing that in winter when crops are not supposed to be growing under ordinary circumstances, the sewage of a town which is flowing off land, leaves in the land itself, quite apart from the crop, 5-6ths or 5-7ths of its manurial properties, and passes off transparent, would not that alter your view, and would not it appear to you that there was a stock being laid up in the soil for the growing crop in the spring?—It seems to me that the great object is to diminish the volume of water in which the sewage is embodied.

4687. (*Chairman.*) What is the proportion of water to your manurial matter at Broadmoor?—From 40 to 50 gallons each individual.

4688. That is a very excessive volume is it not?—It is more than I should like to have if I could control it.

4689. But supposing a town did not consume more than 10 or 12 gallons a head, and that the ordinary surface water was not more than 40 gallons a head, would you go to any great expense to cut off the 40 gallons a head?—If I could get 40 gallons a head every day along with the other I might hesitate about it; but if I were to be liable to get it in excessive gluts at times when I could not possibly control it, I would try to find out some other way of dealing with it.

4690. (*Professor Way.*) Possibly you would say in the case before us of Windsor, where there may be an opportunity of separating the surface water, that as a matter of course you would endeavour to carry out that separation; but the question is, whether if there were 40 or 50 gallons per head per day altogether the non-separation of that sewage would be an obstacle to its application?—No; I do not think it would be. I should look at the question as much in a sanitary light as I would in a commercial one. If those street gullies, which I see everywhere, did not communicate with the foul drains there would be a very great saving of expense to the local authorities. At the present moment it costs the town in brickwork to keep the sewers perfectly tight to act as drains, something like 20*l.* a year: it costs the town for leakage and evaporation, (the drains being required to be kept filled with water during the summer and winter months) about 45*l.* a year, and lastly it costs the town something like 25*l.* or 35*l.* a year to take the sand out of the main drain, about 50 tons of which goes into it from off the streets. All this expense is borne upon the rates. If the two were separated, sewage and surface water, all those expenses would cease, and the saving to the town would be something like 85*l.* a year. You have a right to capitalise that at, say, 25 years' purchase. Of course the whole of that capital might just as well have been expended in changing that system of drainage. And not only would you save those expenses, but you would create a much healthier state of matters for the town, because in spite of all the care that it is possible to take, I am quite sure that everyone who lives in the town would bear me out that it is impossible to prevent those gullies emitting a stench at times; and in the year when the fever was so bad in Windsor, and when Mr. Symon was sent down to report upon it, he gave as one of the causes of the prevalence of fever, the amount of foul air that escaped through those gullies at the time. And that quite accords with my own experience of it.

4691. (*Chairman.*) Are the sewers of Windsor ventilated?—They are to a certain extent.

4692. Are they ventilated as far as they might be?—Not as they ought to be. I should mention that besides those 50 tons of sand which are taken out of the sewer in the town of Windsor itself, we push some 50 tons into the river, and an immense quantity goes out in suspension into the river as well.

4693. (*Professor Way.*) You say that in Windsor, with a certain amount of management, the separation of the sewage from the surface drainage could take place, but do you consider that that system is capable of general application?—I believe that that principle is the right one, and that by some means or other you ought to adopt it if you are to work sewage properly.

4694. As a necessity of the case do you mean, or as an advantage?—I would not put it as a necessity.

4695. You would say in fact that where there were no means of separating the rainfall from the sewage, you could not apply the sewage advantageously?—I can scarcely contemplate a case where you could not separate the two. I speak of course with very limited experience upon that matter.

4696. (*Chairman.*) Instead of those clumsy gullies which one sees in Windsor, could not much smaller gullies be used which would take away all ordinary surface water, leaving the excessive flood water to run down the surface channel?—I have never seen such a system carried out. I have here a plan on a large scale of the town drainage. In re-devising any scheme for the drainage of Windsor, it seems to me that the point near the Long Walk, which is the lowest of the town drainage, must be the starting point for the new outfall. The whole country round is very flat. It is impossible that irrigation could proceed round the Long Walk, or in close proximity to the town, it must be somewhere out in the country. This necessitates a new drain being constructed to take the sewage away. The first question you have to settle is, what is the size that this drain is to be? I do not think that looking at the country round any greater fall could be got than probably something like 3 feet in a mile. Then looking at the probable population of the whole neighbourhood, it would be necessary to provide for not less than 20,000 people, and to assume that they are going to use something like 30 gallons per head per diem; that brings you to the quantity of 600,000 gallons per diem. It is to be remembered, too, that the volume of sewage is not a regular thing that comes equally over the 24 hours, but in all probability a great glut of it comes during about two hours in the middle of the day. The new drain must be of a capacity to take that with perfect freedom, and therefore I should consider that in order to provide for that at all times you must have something like a two feet sewer capable of carrying 100,000 gallons an hour. You would thus always be master of the household and sewage water. Provided there was no rainwater to disturb these arrangements, the action of that drain would be this. During so many hours in the night there would be nothing at all passing; in the early part of the morning the water would gradually begin to flow; between 11 and 12 it would be at its maximum when the flushing power was on; then it would gradually die out, and at 9 at night the whole thing would be stopped. The sewage would thus be flowing pretty nearly all in the daylight when people can attend to it. But supposing you took also the surface drainage, seeing that Windsor is situated on an area of a square mile, if you had something like a quarter of an inch of rain in 24 hours, the drain would be filled from 12 o'clock at night to 12 o'clock next night, and it would be dis-

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charging not 600,000 gallons in the 24 hours, but 2,000,000 gallons. Then comes the question what is to be done with this vast quantity of water when it is there. We should have all the sand which is now deposited in the invert. We should have all that water to pump at great expense, necessitating coal and night work, which has to be paid for extra. We should have more land to lay out. In short, we should get into far greater expenses in every way. Another difficulty which would arise is this, supposing the present main sewer were to take the Cranbourne water as at present, if the system were adopted of combining the sewage and the surface water, there would have to be made a well near the Long Walk somewhere, and that well should have an overflow into the old drain. When there was a heavy rain on, there would be all that rainfall running down the new drain to the pumping station, and all the sand and stuff with it. Directly the solid matter of the sewage came into that well the new drain not being able to receive it, the sewage would float upwards, get to the top and get into the old or present drain, and there lodge in that long mile of drain between that point and the river. This would generally happen in the middle of the day when the flow of sewage is at its maximum, and the consequence would be that many times you would have as great a nuisance as ever, because there would not be water enough then from the town to flush that old overflow. That would happen every time the rain exceeded a quarter of an inch in 24 hours. The rainfall of the district is 20 to 22 inches in the year, and it would be a very great nuisance indeed if for an hour or two in the middle of the day, every wet day, the sewage matter boiled up and got lodged there with nothing to carry it off.

4697. (*Mr. Harrison.*) It would become a greater nuisance than now?—Yes, because the old drain is exceedingly flat, the fall being only 3 feet 3 in a mile. Looking at that difficulty, which I have thought of for a great many years, I never could see any possible means of perfectly curing the state of matters with the present system of drainage.

4698. (*Professor Way.*) Supposing a case in which it was absolutely impossible to separate the rainfall from the sewage, would you be diffident about dealing with that state of things?—If it were absolutely impossible I could not deal with it at all, but I should be slow to acknowledge that it was not possible.

4699. Assuming it was impossible, would the impossibility constitute a strong enough argument to urge against the adoption of a system of application of sewage to land?—No, you must be guided by the circumstances of the case.

4700. (*Chairman.*) Take the case of a district, town, village, or public building, which has never been sewered or drained. Nature has made arrangements for passing the water away in some manner and with some sort of effect. (Either the low lands are flooded or they are not, and if they are flooded there are means of preventing that flooding or modifying it in some way.) Do not you think it possible, without making two sets of sewers, one for surface water and one for sewage, so to devise your sewers that they shall do the work of sewers, and that the surface rainfall shall be left to go its own course as it did before you made any sewers?—I should not like to say what is or is not possible, only I have never seen what you describe done in such a way as would satisfy me that I could deal with the stuff afterwards in the best manner.

4701. You would want separate arrangements for carrying away the surface water?—Nearly every place has an outlet for the surface water naturally, which might be improved by some means, and I should consider that the advantages of separating the surface water from the sewage would quite counterbalance the saving of cost in putting the two together.

4702. Take the case of Broadmoor. If you had not that tank for collecting the rainwater, do you apprehend there would have been any serious difficulty in discharging the down spouts into surface gutters and letting the water away by surface channels?—None at all, but I should have got it into the nearest natural watercourse by the shortest route.

4703. Over the surface?—Yes.

4704. Then it would not have been necessary to make a duplicate system of sewers, one for rainwater and one for sewage water?—I would not have made what I call sewers for the surface water outside the buildings. I would have made open gutter channels for the rainwater.

4705. You do not wish to be understood as saying that there must be two systems, one set of sewers for the rainwater and one for sewage water?—I do not consider a drain to carry away the rainwater a sewer at all.

4706. Would you in all cases make what you call underground drains?—Certainly not.

4707. It would only be in exceptional cases?—Yes, where I could not get the surface water away by any other means. If I had to devise a system of sewerage for any building I should let the rainfall go to the nearest watercourse.

4708. But you would strive in all reasonable ways to separate the rainfall from your sewage proper?—Yes, certainly.

4709. And you would keep the sewage to itself as much as possible, so that you might have a constant quantity the whole year through?—Yes.

4710. Then you would know what you had to deal with?—Yes.

4711. If you found by experience you could do with more water than you had in that sewage, of course you might arrange to take in more water?—Most certainly, as long as it was under control.

4712. You would not propound the dictum that every town must have two sets of sewers?—Not at all. Take, for instance, this side of Windsor, which falls towards the Thames; three parts of the rainwater that falls there would go into the river without going into the drain at all. You have simply to shut up one or two gullies and make a communication between them, or shut them up altogether and let the water go into the river at once. I believe the whole of the rainfall on that side of the town might go in at about four or five points, at very little more cost than simply shutting the gullies up.

4713. But that did not occur to the person who laid out this system of sewers?—It was not thought of at the time.

4714. He only thought of taking the surface water into the artificial sewer, which he made large enough for men to go in and cleanse the grit out?—Yes.

4715. If he had made on the principle you recommend a two-feet pipe, do you not anticipate that you would have had it choked?—No, it would have worked much better and would have been carried out at a less cost.

4716. And it would have carried the sewage to the point where you wanted it as safely and rapidly as the present large sewer?—I consider it would have done so better than the present sewer, because the flushing water would have acted more beneficially upon the dead weight of sand in the sewer and pushed it along more effectually. The more confined the space acted upon the better.

4717. There is less area to ventilate and less gas to deal with?—Yes, in every way it would have been better.

4718. As a matter of cost, would not it have been a greater cost to have made the sewers according to your plan than on the present system?—One could hardly say that without going into the whole question. The increase, if any, in the expense of construction, would be more than counter-balanced by the increase of the value of the sewage at the outlet arising from its being in a small volume and undiluted.

4719. How many acres do you say the Cranbourne drains?—1,500 acres.

4720. What is the subsoil principally?—Clay, almost entirely.

4721. You say that, in such a summer as the last, that

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brook entirely dried up?—Entirely, and in excessive floods it will be eight feet deep and five or six feet across.

4722. Are you quite sure there is nothing in that stream during dry weather, is not the water taken away from it somewhere?—No, it comes straight down and discharges into the main sewer.

4723. According to experience in other places, there would be about $\frac{3}{4}$ of 1 cubic foot of water coming from it per second in the driest weather if there were 200 or 300 cubic feet per second in wet weather?—I know there was not a drop in it, either this summer or last summer.

4724. Is there anything further which you wish to state to the Commissioners?—With respect to the solid matter when separated from the sewage proper, I have had an opportunity of testing its capabilities alongside of farm manure. When we emptied the tank at Broadmoor in the spring, we took out 30 tons of solid matter mixed with as much ashes as would take it up; the ashes of the building just form the absorbing quantity.

4725. (*Mr. Harrison.*) What is the proportion of ashes to the solid matter?—About half and half, 15 tons of each. I directed those 30 tons to be put on two acres of very poor land, and the same quantity of good ordinary farm yard manure, (not so good as London manure), to be put on two acres immediately adjoining, and the land was sown with Swedish turnips in the spring. The turnips dressed with the stuff out of the tank had rather the best of it about a month ago, and therefore, I considered the stuff quite equal in value to that farm yard manure which would be worth there in all probability 8*s.* a ton. London manure could not be got under 10*s.* to 15*s.*

4726. (*Professor Way.*) Are you aware that in towns where the solid matter is mixed with ashes, they have the greatest difficulty in getting people to cart it away at 2*s.* a ton?—I apprehend that that is a different article to that at Broadmoor. When they bring the 50 tons of sand out of the Windsor drain, where it has been lying soaking in the sewage, it is perfectly worthless as manure; but I should be very sorry to give away that stuff at Broadmoor.

4727. (*Chairman.*) Does that material cause a stench when you empty it?—Yes, if you are close to it.

4728. Putridity has set in?—Yes, no doubt about that. Of course it is never emptied but when the wind is blowing away from the building, I should always like to have the irrigation on the north or east side of any adjacent building or population.

The witness withdrew.

Adjourned to to-morrow at 10 o'clock.

Town Hall, Windsor, Thursday, 30th November 1865.

PRESENT:

ROBERT RAWLINSON, ESQ., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

Mr. CHARLES THOMAS PHILLIPS (of Windsor) examined.

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4729. (*Chairman.*) Are you clerk to the Windsor board of health?—I am.

4730. How long have you held that appointment?—Only since the 7th of last December; before that I was a member of the town council for five years.

4731. Do you know what amount has been paid for the sewerage of Windsor?—Mr. Dethick's contract in 1850 for the draining was 3,805*l.* I believe that sums were paid in excess of that contract, but I do not know how much.

4732. Do you know where the sewers now empty themselves into the river?—Yes.

4733. Have you had any discussions in the town council recently as to any alteration of that mode of outlet?—Yes; the board received a communication from Mr. Menzies with reference to the sewers in the town, and a deputation was appointed from the board to go and see Mr. Menzies' system at work at Broadmoor.

4734. Have complaints been made at any time by the Crown authorities as to the nuisance caused by your sewage?—I was not aware of any until the statement was made by Mr. Menzies as to the state of the sewage at the outfall.

4735. Have you ever looked at that outfall?—Yes; I went to the outfall with Mr. Menzies, and with a deputation from the board.

4736. You saw the sewage passing into the river?—Yes.

4737. Are there many cesspools still in Old Windsor?—I understand that there are not above 30 all over the borough unconnected with a sewer; that I have had from the surveyor.

4738. Why are they allowed to remain?—I think the main cause is that they are principally at Spittal, which lies beyond the system of drainage. We can compel parties, by the Act of Parliament, to connect their drains with the sewer, but not unless the sewer comes within 100 yards of their drains.

4739. You have had no proposition made to complete the system?—No.

4740. Do you know by whom the culvert was constructed through the Home Park?—I believe it was constructed by the Crown.

4741. (*Mr. Harrison.*) Cannot you tell by your books?—No, I think not, it would be very far back; as I understood Mr. Menzies' evidence yesterday, it was made in 1848, ours was made in 1850 or 1851.

4742. (*Professor Way.*) Has the question of the utilization of the sewage of Windsor come under the consideration of the local board?—It was put to us by Mr. Menzies' report.

4743. What is the actual state of the question at this moment?—The matter is in suspense until we know a little more of Mr. Menzies' views, and until they come more definitely before us.

4744. No plan has been originated by yourselves?—None; I believe that some time back a plan was brought before us to deodorize the sewage, and make it practically useful. I think that was Mr. Rogers' plan.

4745. Was that by the use of peat charcoal?—Yes.

4746. When was that brought before you?—I think it was somewhere about 1852 or 1853.

4747. (*Chairman.*) Is there any other information that you have to communicate to the Commissioners?—I merely wish to mention that the question of the water supply of the town has been recently investigated by a special committee, which has reported to the board on the subject.

4748. What was the purport of their report?—The purport of their report was that the only requirement we had to make of the waterworks company was that

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there should be a continuous supply of water throughout the town in the 24 hours, and that we should be in a position to lay on water to the small tenements at the statutable rate of 2*d.* per week.

4749. Has that been acceded to?—It has been recently communicated to Mr. Cutler, the proprietor, and his letter in reply will be submitted to the board to-day, that a continuous supply is not absolutely necessary. He also says, that water has been supplied already to the small tenants at the statutable rate.

4750. Has there been any question before the board relative to the purchase of those works?—That question was also referred to this Committee, and they decided that it was not desirable to purchase them, because there were so many difficulties in the way.

4751. Under what powers are the streets broken up for laying mains, or repairing or executing works?—Under a lease from the corporation of very ancient date. I have a statement of it here in the Report of the Committee. "By a lease dated the " 24th February 1696, 20 feet square of ground near " the Market Cross, and a piece of ground covered " with water between Cooper's Eyot and the Brocas " (the Fireworks Eyot), was leased to one John Yar- " nold of the city of Worcester for 500 years at a " rent of two good fat sweet capons, to erect a tank " at the Market Cross and his works at Cooper's " Eyot. Yarnold was prohibited from underletting " without leave of the corporation, had power to " carry pipes through all streets, and to break up " pavements to repair. He was not to interfere with " the navigation, and was to make good any damage " from the breakage or overflow of the pipes. Power " was reserved to the burgesses to break open the " mains in case of fire, and the lease contained a pro- " viso, that if the rent was not paid, or the personal " covenants were not complied with, the lease was to " be void."

4752. That is the power under which the present proprietors act?—Yes.

4753. Are the two good fat sweet capons regularly paid?—A guinea a-year is paid in lieu to the town council.

4754. Is there anything farther that you wish to add?—I will hand in a copy of the byelaws. (*The same was handed in.*)

The witness withdrew.

Mr. J. C. Barton.

Mr. JOHN SCURR BARTON (of Eton) examined.

4755. (*Chairman.*) You are chairman of the local board at Eton?—Yes.

4756. Is Eton sewered?—Yes, it is well sewered.

4757. Who laid out the sewers?—I think a Mr. Rowe.

4758. Do you know where the sewage goes to?—It is passed into a by-stream of the Thames.

4759. But ultimately does it find its way into the Thames?—Yes.

4760. Are waterclosets pretty general at Eton?—Yes, in almost all the houses.

4761. Have you done away with cesspools?—Yes, entirely.

4762. Then the entire sewage and refuse matter of Eton pass into the sewers?—Entirely.

4763. They are drained into the sewers and passed direct into the Thames?—Yes; firstly through a small stream, a narrow back stream.

4764. Does that stream cause you any nuisance during dry weather?—No, I have never heard any complaint.

4765. You have heard no complaint from any person?—Never.

4766. Has it ever occurred to your board that it might be advisable to utilize the sewage upon the land?—I have never heard it discussed at the board.

4767. Have you a water supply at Eton?—Yes, a very good water supply.

4768. Is that obtained from the same source as the Windsor water supply?—Yes.

4769. What is the population of Eton?—About 3,000.

4770. Is the college drained into the same outlet sewer as the town?—No; it has an independent system of sewerage.

4771. Do you know anything of the condition of the locks or the navigation?—I know that the locks at Windsor are very much out of repair.

4772. Is any part of Eton liable to be flooded?—I have known it flooded all round.

4773. Have you known the streets flooded?—I have known the water run across the streets in one place.

4774. Is the land in the vicinity flooded?—Yes, occasionally; but it is very seldom that that occurs.

4775. Are those floods not so bad as they were formerly?—I think they are not nearly so bad, from all I have understood, as they were formerly.

4776. Have you done anything, as a local board, to prevent flooding?—Nothing particular. The diminution of the flood is, I think, more owing to the removal of the old bridge and of the bridge at Datchet, than to any measures taken specially for the purpose.

4777. The removal of the bridges has given more water-way?—Yes, the river is freer than it was.

4778. Have complaints been made as to any of the new bridges offering impediment?—No.

4779. (*Mr. Harrison.*) Do you know of any land that would be suitable for the application of the sewage?—It would be very difficult to find any in the vicinity of Eton.

4780. (*Chairman.*) Has the local board any property; does it own any river frontage?—None.

4781. Or any wharves?—No.

4782. (*Professor Way.*) What difficulty do you apprehend in finding land in the neighbourhood of Eton for the application of the sewage?—A great deal of the land is occupied by the Eton boys as a playground.

4783. That is within a small radius from Eton, I suppose?—Yes.

4784. (*Mr. Harrison.*) Could land be found a mile or two below the town?—There is plenty of land on to which the sewage might be put, but I do not know whether it would be suitable for the spreading of sewage over it; there is land between Slough and Eton, a large tract of land.

4785. (*Chairman.*) Do you exercise any jurisdiction as a local board in cleansing the Thames opposite the town, or in any way improving it, ballasting it, &c.?—No, not in Eton.

4786. You do not expend any money for that purpose?—No.

4787. Is the river in a better or worse condition now than it was when you first knew it, with regard to weeds and obstructions?—I do not think there is much difference. I have known it ever since I was a boy, and I do not see much alteration in it.

4788. Do you ever see any dead animals floating in the river?—Yes, frequently.

4789. Does the local board take any steps to cleanse the river from such nuisances?—No.

The witness withdrew.

Mr. J. Treacher.

Mr. JOHN TREACHER (of Twyford) examined.

4790. (*Chairman.*) Where do you reside?—At Twyford.

4791. Your late father was surveyor to the Thames Commissioners?—Yes, he was; during 26 years.

4792. How long has he been dead?—He died in December 1862.

4793. Did he continue surveyor up to the time of his death?—Yes, he did.

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4794. Are you acquainted with the river?—Yes, I have been acquainted with the river for more than 30 years.

4795. From having any employment upon it, or as living in the district?—I privately assisted my father during the greater part of the period to which I can speak.

4796. You know then, I suppose, something of the difficulties into which the Thames has fallen?—Yes, I do.

4797. To what do you attribute those difficulties?—I consider that the bondholders have received too much interest, and that they received it too long after the traffic had fallen off and had been taken away by the railway.

4798. Did the bondholders receive more interest than was promised to them when they lent their money?—No; they could not receive more than five per cent., but then the funds were not sufficient to pay five per cent. after the works were repaired.

4799. Has not a bondholder a claim upon any money that might be in the hands of the Commissioners, seeing that he lent his money for the sole purpose of receiving interest upon it?—I consider that the Thames Commissioners were bound to keep the river in a good state of repair, whether they paid their debts or not, and before they paid their debts.

4800. Were the bondholders of that opinion?—Some of them may have been and some not, but it would have been more to their interest to have had the river kept in repair and to have received a low dividend than to have been paid so much interest for their money and let the river go to ruin.

4801. In what condition is the river now?—It is in a very bad condition at the present time; the works are in a very dangerous state.

4802. Can you specify any particular parts?—I know that old Windsor pound lock is in a very bad state. It was built in 1821, and the sheeting has never been much repaired since; therefore it must be worn out, and is in danger of blowing.

4803. What other lock can you mention that is in a bad condition?—Sonning pound lock must be in a dangerous state, Marlow pound lock, and several others, Ray mill or Boulter's, Day's lock, and Caversham; and indeed most of the pound locks I should say nearly all of them are in a bad state. There is only one that is in a pretty good state, Temple lock, that is situated below Hambledon, a few miles above Hurley.

4804. Do you know anything of the mills upon the Thames?—Yes; I know that a great many of the mill owners are a great evil to the Thames. The mill owners, through their selfish way of penning the water back too long when the water is rising, are one cause of the floods; they do not draw the head of water down soon enough.

4805. Had the engineer in your father's time no control or power to prevent such injurious penning of the water?—Yes, he had some control, but of course it was impossible for him to be at every place at the same time. It may happen in the night; the flood water may come down and rise above the mark.

4806. What would you do or recommend to prevent this in future?—Nothing can be done unless the mill owners can be ruled. That has been a puzzle to the Commissioners for a great many years.

4807. Then the mill owners and the Commissioners have been for many years antagonistic to each other?—Yes; with regard to the penning of the water my father had great trouble with the mill owners at various times. Also they would run the water for the fisheries in low water time, and catch the barges upon the shallows, and so injure the navigation.

4808. Then they send down flashes?—Flashes have been done away with for some years; my father was the cause. He recommended to the Commissioners to do away with them.

4809. Are there no flashes used now in the upper parts of the Thames?—None that I know of.

4810. (*Mr. Harrison.*) Are you not aware that flashes are still sent down regularly twice in a week?—No; they have been done away with for some years; there are none below Oxford I know—at least there were none during several years—I know that my father stopped them.

4811. (*Professor Way.*) You mean that there ought not to have been any?—Yes.

4812. (*Chairman.*) The practice may have grown up again since your father died?—Yes; that is true.

4813. (*Mr. Harrison.*) Was any resolution come to by the Commissioners or by the committee as to these flashes being stopped?—I believe so.

4814. In what year did that occur?—I do not know when they were stopped exactly, but not more than ten or twelve years ago.

4815. (*Chairman.*) You believe that they were stopped?—Yes; I believe so.

4816. (*Professor Way.*) What measures did your father take to get them stopped?—He reported to the Commissioners that the flashes were injurious to the navigation, and the Commissioners thereupon stopped them. The report is dated February 14th 1856.

4817. By issuing some order?—Yes; so I understood at the time.

4818. (*Chairman.*) Had your father disputes with any of the millers as to their raising the head of water?—Yes; at various times he had great disputes with them in all parts of the river. They always wanted to raise the mark to get a better head of water.

4819. Do you remember the railway coming into competition with the river?—I do. The Commissioners opposed it; we had a great deal to do in opposing it.

4820. Has the falling off of the traffic on the river been in consequence of the railway carrying the goods?—Yes, entirely so. It was no fault whatever of the works. The railway carried the goods quicker and cheaper.

4821. Do you believe that the Thames could be put into such a state of repair that sufficient money would be earned to maintain the works and pay interest upon the money borrowed?—I am certain that it could not.

4822. Is there any possibility of raising funds from the navigation to pay off the present bondholders?—I am certain that you never could do so, and that you would never get a traffic on the river again. I say that from calculations that we made for many years.

4823. What would you do with the navigation works if you were called upon to give an opinion?—There ought to be an alteration altogether. The present pound locks are useless and the present state of the navigation must come to an end shortly.

4824. Would it be necessary to keep up some of the works for the sake of the river?—Yes; I do think so; but the millers will always keep a sufficient head of water themselves.

4825. But would it be sufficient to hand the river over to the millers and leave them to regulate it?—If it was handed over to them, they would perhaps abuse their power.

4826. Were any complaints made during the time when you were connected with the river as to the washing away of the banks at any particular parts by floods?—No, not exactly so; but we were aware that the banks were very much washed away, and were undermined and fell down in some places, and in others they would be added to very much.

4827. Had your father any power to prevent that by works that he might have constructed?—No, he had none.

4828. If the towing-path, for example, were washed away what would have been done?—We should have made another farther into the meadows.

4829. Had you to ask leave to do so of the persons owning the land?—Not that I am aware of; a fixed rent for the towing-path was paid to the occupiers of the land all the way down the river.

4830. Did you consider that towing-path as a private or a public road?—A public road.

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4831. Did you ever warn private persons off it?—Never, but we did not permit wheeled carriages to pass.

4832. Did you permit persons to ride on horseback on the towing-path?—We never interfered with them.

4833. Did the Commissioners order any ballasting to be done during the time that you were connected with the river?—Yes, a great deal of ballasting was continually done down to the last few years in my father's term of office; they were ballasting in all parts of the river.

4834. Were the persons who did the ballasting employed by the Commissioners, or were they allowed to ballast on their own account?—They belonged to the Commissioners; my father seldom allowed anyone to do it on his own account, for generally persons ballasting on their own account did mischief by ballasting in the wrong places.

4835. Were the materials that were taken out of the river sold?—Never; the Commissioners never sold any gravel that I am aware of, they put it on the towing-paths, it was ballasted to make the towing-paths and to assist the barges over the shallows.

4836. Were you in the habit at that time of cutting down the weeds at particular times of the year in any of the reaches of the river?—Very seldom, the weeds generally did more good to the navigation than harm in keeping up the water in low-water time.

4837. Had you difficulty with regard to encroachments made by persons in planting osiers?—People would plant osiers at the ends of the eyotts sometimes, but we never had much difficulty in that respect.

4838. (*Mr. Harrison.*) You have said that if the navigation was given up the millers would keep up the water?—Yes, I believe so; I think they would do it for their own security.

4839. How would boats then pass?—Boats would pass as they did formerly; the mill owners and the old lock owners have always had a toll paid to them, and the maintenance of these tolls has always been one of the great hindrances to the navigation. The Commissioners have tried to meet the lock owners many times, and to come to some agreement with them, but the lock owners would never lower their tolls.

4840. If the Thames Commission was put an end to would the millers be obliged to pass boats in some way or other?—Yes, the lock owners I suppose would be obliged to pass the boats as they did formerly; in about the year 1772 the barges went down the old locks.

4841. Was the water at those locks penned up as high as it is now?—Yes, in some places, but the water-marks have been continually altered.

4842. Can you give the Commissioners any information as to the extent to which the water has been raised at different points upon the river?—I cannot, because it has been changed backwards and forwards at different times, sometimes it has been lower and sometimes higher, according to the complaints of the landowners above. I have known the water penned up at certain places so as to injure the land very much in the summer time when a sudden flash has come down or a flood.

4843. Are the pound locks generally placed where there were mills existing before their formation?—Yes, I believe so in nearly every case.

4844. Is that so at Windsor immediately below the town?—I am not certain.

4845. To whom does the weir below Windsor Bridge belong?—To the Commissioners, I believe.

4846. Was there a weir there before the Commissioners put theirs up?—I think not.

4847. That is a case in which there was no penning up by a weir before the Commissioners erected that weir?—Yes.

4848. Are there any other places similar to that on the river?—I do not know many places; several of the old locks belong to the Commissioners; they have bought them in order to throw off the old lock tolls, and so relieve the navigation.

4849. Are there weirs at those places?—Yes.

4850. Who repairs them now?—The mill owners generally repair those belonging to themselves.

4851. Do you mean in those cases in which the Commissioners have bought them?—The Commissioners have bought locks in some cases, but not the weirs; the weirs are separate from the old locks. In some cases part of a weir belongs to the Commissioners, as at Sonning; a small part of the weir belongs to the Commissioners, and they must keep that part in repair, the other part belongs to the miller or mill-owner.

4852. (*Chairman.*) Have the Commissioners jurisdiction over any of the branch rivers that come down into the Thames?—None whatever, except the Kennet, as far as the middle of Reading.

4853. There are mills and weirs upon those branch rivers?—Yes.

4854. Is there navigation upon any of those branch rivers?—Only on the Kennet.

4855. (*Mr. Harrison.*) Have you observed any variation of late years in the rapidity with which floods come down?—Yes; the last great flood was in 1841, but since that time we have seldom had any great flood.

4856. In 1852 was there not a flood?—In 1852 it was not so great as in 1841. We have had very dry weather in the last two years, and lower water than ever I remember.

4857. Do ordinary floods come down more rapidly than they used to do?—Not the least; they come down as they always have come down. About the same amount of rain will produce the same amount of flood.

4858. (*Chairman.*) Do you know what height the flood of 1841 rose above the summer level?—Not exactly. I examined the valley of the Thames then, and I found that nearly all the flood-water might have been passed down the channel of the river had there not been solid weirs in places and so many rod eyotts and obstructions to the water.

4859. You think that even that flood, great as it was, might have been passed down the river by proper arrangements?—Yes, quite so; because in crossing the valley during the time of the greatest flood I found very little stream in the meadows, in fact what was upon the meadows was nearly all dead water. The water spreads as soon as it gets above the banks of the Thames upon the meadows, and there remains, and seldom runs off.

4860. I believe you have objected to some remarks that were made at Reading with respect to your father?—Yes. Mr. Pring, I believe, remarked that my father's great inattention to the navigation was one cause of its declining and coming to ruin, and at the same time said that my father accumulated money.

4861. (*Mr. Harrison.*) Did you hear Mr. Pring say so?—No; I read it in the Reading papers; and that Mr. Pring said there was a discount allowed the surveyor. I say there was no discount. My father had nothing but his salary, 320*l.* a-year, and he paid all his expenses out of it; some years they were at least 130*l.*

4862. (*Chairman.*) You deny the accuracy of the statement that was made with respect to your father?—I do.

The witness withdrew.

Mr. F. Brown.

Mr. FREDERICK BROWN (Borough Surveyor of Windsor) examined.

4863. (*Chairman.*) How long have you been surveyor of Windsor?—For the last seven years.

4864. Are you an engineer or architect?—I am a surveyor.

4865. Had you any experience of works before your appointment in Windsor?—The drainage works in Windsor were the first I undertook. I carried them out under the superintendence of Mr. Rowe.

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4866. In what year was that?—In 1850. Windsor was the first borough that was drained after the passing of the Board of Health Act.

4867. Do you know what the cost of the works amounted to?—It was over 4,000*l.*, to the best of my belief.

4868. For the main sewer and the branches?—Yes, for the entire system.

4869. Do you know whether Mr. Rowe designed and executed a large sewer through the park?—No, he did not.

4870. Who designed that sewer?—Captain Vetch.

4871. Was it paid for out of Crown funds?—Yes; and it was executed by the Government authorities.

4872. Do you know where the sewers emptied themselves before the sewerage of Windsor was laid out?—There were several black ditches, which I believe ultimately discharged into the course that is now taken and enclosed by the Crown authorities; it was originally an open watercourse into which the whole of the sewage of the borough on the east side, at all events, was discharged.

4873. Are your main sewers ventilated?—Yes, they are.

4874. At what points and in what manner?—They were originally ventilated by shafts introduced at the crown of the sewer and brought up to the surface, but within the last few years that has been found objectionable. A ventilating pipe has been introduced at the spring of the arch and brought to the highest attainable point. We have found that to answer admirably; but previously to that, and during the time of our flushing operations, parties complained very bitterly of gases passing through to their closets and into their houses. Since the ventilating pipes were introduced I have not heard a single complaint.

4875. Do the rain-water pipes communicate directly with the sewers?—Very many of them. They also act as ventilators.

4876. Are there cesspools in Windsor?—There are cesspools within the borough, but I am not aware of the existence of more than one within the limits where by the Act of Parliament we have power to stop cesspools.

4877. How comes that one to remain?—That is in disuse. I think it is at the theatre; the authorities had notice to connect, and I do not know for what reason, but the works were not executed.

4878. Have any complaints been made of foul smells from the sewers?—Not latterly.

4879. Had you no complaints in the last summer?—There were fewer complaints in the last summer than in the previous summer. Where a complaint has been made of foulness of drains, that has generally been from the want of proper attention on the part of the tenants in not closing the traps in various parts of the house, such as the stink-traps at the sinks.

4880. How many ventilating pipes have you put into the sewers?—I think we have put in seven or eight; three have been introduced into the mains, and others at the head of the branches, the pipe-sewers.

4881. Do you use charcoal to filter the gases?—No.

4882. Have no complaints been made to you by the Crown authorities as to flooding or fouling the surface of the park during heavy rains?—Yes, there have been great complaints made, and more particularly this last summer, of the foulness of the Thames occasioned by the sewage matter of the town passing through the Crown lands into the river.

4883. Have you paid any attention at all to the application of sewage to land?—No, I have not; but I have had an opportunity this season of witnessing a scheme that was laid down by a gentleman at Broadmoor, and which appeared to work most advantageously.

4884. Have you seen the system in operation at Croydon?—No; but I have heard of it.

4885. Have you been to Worthing?—No.

4886. Do you think it would not be worth your while to visit those places?—I think, from what I have heard, that I possess sufficient knowledge not to recommend the board to adopt a similar plan to that which is laid down at Croydon.

4887. Upon what grounds?—Because it has proved a failure.

4888. What has proved a failure?—From the want of means of separating the sewage matter from the surface drainage it appears that the land has been overflooded, and the occupier of the land has been put to considerable inconvenience and expense.

4889. As the servant of the corporation of Windsor, and liable, therefore, to be called upon by them for advice as to what should or should not be done, do you think it would be advisable for you to make yourself acquainted by actual inspection with what is being done, and not to rely upon hearsay?—I should say it would be advisable.

4890. Should you be surprised to learn that you have been very wrongly informed upon this subject?—I should be surprised. I have seen a letter, written by the person who had taken a contract for the sewage of Croydon, in which he bitterly complained of the manner in which the town of Croydon served him. It would appear that in addition to his contract, or what he considered to be his contract to take the sewage matter, he had to take the surface water.

4891. (*Professor Way.*) Are you speaking of Mr. Marridge?—Yes. He was compelled to take all the surface water, and by that means he was prevented from the possibility of turning to account the matter that was really valuable.

4892. Do you think you could separate the surface water from the sewage water in Windsor?—I have no doubt it could be done, but I cannot give a decided opinion upon that point myself.

4893. (*Mr. Harrison.*) When was that letter of Mr. Marridge's written?—I think about two months back.

4894. (*Chairman.*) Have you a copy of it here?—No.

4895. Was it written to you?—No; it was a copy cut out of a newspaper.

4896. (*Professor Way.*) Do you remember whether Mr. Marridge said in that letter that he was going to give up the occupation of the land at the end of his tenancy?—No.

4897. (*Mr. Harrison.*) Are you aware that Mr. Marridge has been advertizing for nearly 12 months past, and offering to give advice to town authorities as to the application of sewage to the land?—No, I am not. The letter to which I have referred is the only one I have seen.

4898. Do you think he would be justified in offering himself by advertisement as an adviser to others upon this subject if he was not perfectly satisfied with the system?—I should say certainly not.

4899. What was the fall through the town of the main sewer?—A foot.

4900. Of what length?—Between 700 and 800 yards. About 730 yards are traversable, and the rest are not traversable.

4901. Is there much deposit in it?—At times the deposit is very heavy.

4902. What quantity have you to take out annually?—The deposit is principally of sand from the gullies. I have taken out within the space of three weeks about four or five tons, but that only occurs when we have heavy rains.

4903. What is the level of your outfall sewer where it joins the Crown sewer as compared with the level of the Home Park adjoining?—I do not know the incline to the river from our inlet to the Crown sewer, but our main trunk is upon a dead level of a foot only.

4904. If the main trunk were continued on at the same level, would it be above or below the grass in the Home Park?—We then come into the same level as the Crown sewer at the invert. The Crown sewer is considerably larger than the town sewer.

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4905. You do not know the levels sufficiently to be able to say whether your sewer could be continued onwards to the grass land down the river so as to be discharged upon the surface without pumping?—I should say not.

4906-7. Have you the actual levels?—No, I have not, but Mr. Menzies told me that the levels between those two points are very trifling.

(*Mr. Menzies.*) Their sewer, where it terminates, is about 11 or 12 feet deep from the surface of the ground, therefore it is impossible to bring the sewage to the surface of the ground without pumping.

The witness withdrew.

Mr. W. H. Cutler.

Mr. W. H. Cutler further examined.

4908. (*Mr. Harrison.*) There has been a water-wheel, as I understood you to say, in the island where your waterworks are, for a number of years?—Yes; the present mill was built about 65 years ago.

4909. Was there any proprietor of the water previous to that?—I am not aware.

4910. Was it before or after the formation of the pound lock by the Thames Commissioners?—That I am not sure of; it was before the present weir was built. I do not know whether there was any lock.

4911. Would not the present weir have been built for the purpose of impounding the water, and making the pound lock useful?—I suppose the lock and the weir were built about the same time, but I have no information about the time when the lock was built.

4912. What was the effect upon your mill, do you suppose, of that weir being erected by the Thames Commissioners?—To increase the power very much, no doubt.

4913. Has advantage been taken of that increase of power?—More effect is given out by the water-wheels, no doubt.

4914. (*Chairman.*) Are you acquainted with the navigation of the river?—Yes, from being upon it. I have a small steamer.

4915. Of what power?—20-horse power.

4916. What is the length of it?—47 feet 6 inches.

4917. What amount of water does it draw?—3 feet 5 inches.

4918. Do you find difficulty in navigating the Thames with it?—Yes, very considerable difficulty. I do not go up and down often enough to become well acquainted with the channel, the navigable channel winds about very much, and does not exactly follow the course of the river; it is not regularly in the centre of the river, or regularly at one side, but varies; unless you know the river very well it is very difficult, with a boat drawing so much water, to pass down at all. There is a place near Chertsey where my boat can hardly get past, it has to be kept in the channel with a pole.

4919. Is that on account of the rapidity of the stream?—No, it is from the winding about of the deep channel of the river.

4920. Your boat can pass through the locks?—Yes, but that is more owing to the power in the boat than to the efficient state of the locks, for I very often have to put a great pressure of steam on to the engines, and actually to drag the boat over different parts of the locks.

4921. (*Mr. Harrison.*) Over the sills of the locks?—Yes; Egham lock particularly is in a very bad state; the sheathing at the bottom of the lock is in bad condition, and there has been some danger of scraping a hole through the bottom of the boat by large nails which stick up in the sheathing.

4922. (*Chairman.*) Do you pay any toll for running this steamer on the river?—I pay a toll for going through the Thames Commissioners locks, but not for going through the Thames Conservancy locks.

4923. Do you pay anything for the privilege of navigating the river?—The toll is 1*s.* for the steamer, and 6*d.* for a boat, which is taken at each lock belonging to the Thames Commissioners.

4924. (*Mr. Harrison.*) Are the Conservancy pound locks free?—Yes, for pleasure boats.

4925. (*Chairman.*) Is your steamer used entirely for pleasure purposes?—Entirely for pleasure.

4926. Are there other steamers which are used in the same way?—Yes, there are some small steamboats, there is one at Clewer belonging to Mr. Daniel Gooch, the chairman of the Great Western Railway; it is a little steel boat.

4927. Of what power is it?—I think he calls it 10-horse power; the engines are very small, but they work with great velocity; they make 360 revolutions in a minute; it is a screw.

4928. Is yours a screw?—I have worked with Griffiths' screw, but the propeller that I use now can hardly be called a screw, it is a very curious looking thing.

4929. Is the river in a better or worse condition now than it was when you first knew it?—It has silted up most decidedly since I have known it; it is not so deep as it used to be, and the weirs and locks are in a much worse state.

4930. (*Mr. Harrison.*) Is there a great deal of leakage in the locks?—Yes.

4931. Enough to create any marked current in the pound?—There is a great deal of current below Windsor lock, and a great deal of leakage at the locks. Windsor weir is in a very bad state now. There was a small amount of repair done to the lock last year, the sheathing at the bottom was repaired and the lower gates were re-hung.

4932. The weir belongs to the Commissioners?—Yes.

4933. Has any one done any repairs to it of late years?—No, the only thing has been that I have found some planks to keep up the head of water.

4934. Has that been with the consent of the Commissioners?—No.

4935. You have done that on your own responsibility?—On my own account.

4936. (*Chairman.*) I suppose that usually there is some water running to waste at the Windsor weir more than you consume at the mill?—Yes, a great deal more. The weir is in such a bad state at present that the water runs away almost as fast as it likes. I would suggest that the lock has nothing to do with the power of the mill.

4937. (*Mr. Harrison.*) I understood you to say that the erection of that weir had had the effect of increasing the power of your mill?—No doubt.

4938. You cannot separate the weir from the lock, they both form part of the navigation works?—Yes.

4939. The lock would be of no use but for the erection of the weir?—Just so, but the weir would be of use without the lock.

4940. You had no power to erect a weir?—No.

4941. The weir was erected by the Thames Commissioners?—Yes. I mean in case of there being difficulty to find funds to keep the navigation works in repair, it would be as well just to have a small lock for pleasure boats, and to keep the weir in repair, or to put in a new weir. I should recommend a good substantial weir to be erected, not of wood, but of cemented brickwork and of iron.

4942. You, as a miller, would recommend that?—Yes.

4943. If the Thames navigation goes to wreck the pound lock would go to wreck also?—Just so.

4944. The weir would go to wreck, and it would be no person's duty to restore it?—Yes.

4945. The water would then flow freely in its old-fashioned way?—Just so.

4946. And the power at your mill would be diminished to what it was before?—Yes, but I do not anticipate that; there are so many people at Windsor who are interested in the state of the weir that I do not suppose it will ever actually disappear altogether. I think that the lock ought to be separated from the

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weir. The lock is exclusively for the navigation. The weir does a great deal more service, it keeps up the head of water, and that is the principal point to consider now, because the navigation is really nothing.

4947. You would like to have the weir kept up for your purposes as a miller, and you think that the town of Windsor would like it kept up because it makes a nice deep pond past Windsor?—Yes; it also adds to the beauty of the scenery round Windsor Castle, and to Eton College it is of the utmost importance. I think there should be a small lock for rowing boats to go through, the same as there is at Teddington; there is a double lock there.

4948. Can your boat go through Teddington lock?—No; mine cannot go through.

4949. If the navigation were put into proper condition would there be much pleasure traffic in steam vessels upon the river?—That is increasing now. Pleasure parties come up by steamers; and some years ago two steamers used to run from London to Hampton Court, but they have been done away with for some years. Lately there has been a new boat, built by the Citizen Company, which runs to Hampton Court during the summer months; but it is exceedingly difficult for a steamboat to get up the river in its present state. The question of putting the river into a state of repair would not be confined to putting the locks and weirs in repair; there would be a great deal of ballasting to be done for the channel. The river below Windsor is in a much worse state than the river above as to the navigable channel. The locks are in about the same state as the navigation in the part above Staines.

4950. Is the river Thames in the neighbourhood of Windsor very winding?—Yes.

4951. Unless looked after is not a winding river sure to be also irregular in its channel and in the depth of the water?—Yes, and to make all sorts of eddies going round the points of land. There are one or two other points that I should like to mention. I was asked yesterday whether I paid anything for taking the water out of my wells. The locks and weirs have nothing to do with the water getting into my wells; the keeping up of a head of water has nothing to do with it. No doubt a good deal of water filters through from my own stream, but that would be quite irrespective of the weir or the lock. I also said that it would be as well to build a lock of cemented brickwork and iron; but there might be some objection, I think, for wrought iron, instead of rusting away, becomes crusted with a sort of rockwork.

4952. Is that when it is in the bed of the river?—I have seen a waterwheel with wrought-iron floats, and these became first of all covered with slime, and then the slime seemed to turn into a sort of rocky sediment and get quite hard.

4953. (*Professor Way.*) These floats are in and out of the water, and an evaporation would be going on from them, and lime would be deposited?—Yes; they are always wet, but they are longer out of the water than they are in.

4954. (*Mr. Harrison.*) If the river was put into a proper state would there be any increase of trade upon the river at Windsor?—There would be some probability of it if the channel were much deepened, because you would have much less current for barges to contend against, and already it appears that there is very little difference between the water traffic and the railway traffic as to freight.

4955. Have you any means at your weir of drawing up sluices to let the flood water go past you without working it through the mill, or letting it go over the weir?—You could not prevent it going over the weir.

4956. Have you any side sluices?—No, I have none.

4957. If the river were put into a proper navigable state, the channels of the river kept properly ballasted, the lower sills of the locks lowered, and the river reduced at low water more to the condition of a canal, would not that give a better depth of water at the tail of the mills, and so be a benefit to the mills?—I think the mill owners would benefit more than the navigation. I am rather afraid of the navigation, but I should be very glad to see much more navigation on the Thames than there is. I may add that I think it is quite time something should be done in the way of utilizing the sewage instead of letting it flow into the river. The river is sometimes in a very bad state at Windsor, but I have noticed it more particularly at Kingston, where my boat has been lying for some weeks, between the railway bridge and Kingston Bridge during the last summer months; the river was in a most disgusting state.

4958. (*Chairman.*) Was the water that you found to be so offensive the same kind of water as the company were pumping for the supply of London?—No, it was below the town.

4959. It was in the same reach was it not?—Yes, but then they took their water from a point above where I was.

4960. (*Professor Way.*) Part of the fouling was due to Kingston?—Yes.

4961. (*Mr. Harrison.*) Is the quantity that the water companies take so large as materially to diminish the quantity of water that flows down below?—I have not noticed that.

The witness withdrew.

Mr. Joseph Fuller (of Maidenhead) examined.

Mr. J. Fuller.

4962. (*Chairman.*) What are you?—A miller on the Thames at Maidenhead.

4963. Is your mill a corn mill?—Yes, and there is a brewery attached to it.

4964. What number of wheels have you?—2.

4965. What number of stones do they drive?—8.

4966. What do you consider to be the ordinary power of the wheels?—About 20 or 25 horse power.

4967. Do you use steam power?—No.

4968. You have cleaning machines besides?—Yes.

4969. What is the height of your head of water?—Above 4 feet at the weir.

4970. (*Mr. Harrison.*) Is that at the best of times?—Yes.

4971. What is it in time of flood?—It decreases as the tail water rises, it may be between 3 and 4 feet now.

4972. How many stones have you to work at now?—We are working full power now. There has been a remark made to this effect, that the old lock tolls were paid by the barge owners for nothing. I wish to know who is to keep the weirs up. The old lock tolls are very small in proportion to the expense of the weirs.

4973. Are you an owner of old lock tolls?—I am only the tenant; the mill belongs to the University.

4974. What does it bring you in a year?—Not 40*l.* a year.

4975. Is the whole of that money expended in maintaining the weir?—A great deal more is expended. It averages, I think, nearly 100*l.* a year.

4976. But the mill could not exist if the weir did not exist?—No, of course not.

4977. If the weir was not kept up the mill power would go?—Yes, of course.

4978. What is the rental of your mill?—No rent named: there is a fine paid every seven years.

4979. Are there two mills on the same head?—Yes; there is also a paper mill belonging to Mr. Grenfell on the same head as my mill.

4980. Do you keep up the weir that maintains the head for both mills?—Yes, and I do not understand why Mr. Grenfell pays nothing.

4981. They have no old lock dues, but you have?

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—Yes; but they go a very small way towards the expense.

4982. (*Chairman.*) Do you or the Thames Commissioners maintain the weir?—We do.

4983. You find the workmen and the material?—Yes.

4984. Do the Thames Commissioners interfere with you?—Not at all.

4985. Would they not complain if you allowed the weir to get out of order?—Yes.

4986. Are you a Thames Commissioner?—I do not know whether I may call myself so.

4987. You have not exercised authority as a Commissioner?—No.

4988. Is the river, since you have been at the mill, better or worse?—A great deal worse; the channel is filled up, and the pound locks are in a wretched state.

4989. Is it filled up by silting and by weeds?—Yes.

4990. Do you cut the weeds in the summer time above you?—Yes, for our own head.

4991. What do you do with them?—We let them float down through the weir.

4992. Have you been troubled with dead animals floating down the river?—Very seldom. In rowing up the river I have noticed dogs lying about occasionally in the river, but not very often; they lie under Cliefden Woods.

4993. Does any sewage pass down into the river near your mill?—No, only from our own place, that drains into the river.

4994. What condition was the river in during last summer; had you enough water to work with?—No, we were very short indeed.

4995. Do you send flashes down from your mill?—No, but we receive them on a Sunday, when we do not want them.

4996. When would those flashes be thrown out?—On Sunday night.

4997. (*Mr. Harrison.*) What is the cause of their lowering the water on Sundays?—It may be done for fishing occasionally, but I think it is generally for repairs, and that the water should be low on Monday for the men to go on with their work.

4998. What is the width of your water wheel?—6 feet.

4999. Have you much trouble in raising it to accommodate it to the altered condition of the water?—We have two screws at each end.

5000. What play have you?—18 inches.

5001. You can raise or lower the wheel?—Yes.

5002. Have you no difficulty in doing so?—No.

5003. How is the water divided between you and your neighbours?—By an osier bed that runs up to the weir, so that the waste water runs between us and them. The weir is above, of course; it is some little distance above the mill.

5004. Have you and Mr. Grenfell each a right to take half or any specified quantity of the water?—There is a certain depth to their head where the entrance is from the main stream to their mill race; we have a small piece of land at the head, and we take care that they do not widen the channel.

5005. Have they power to deepen the channel there?—Yes, I believe so.

5006. And make it as deep as they like?—Yes.

5007. And you have power to control the width on one side?—Yes, on account of that bit of land belonging to us.

5008. Do you generally work together so that the head of water is maintained?—Yes.

5009. Do you stop and start at the same time?—Yes; if barges are stopped, and the bargemen wish us to shut down to raise the head, we send over to the other mill to request them to do so too.

5010. So that both of you have a fair start?—Yes.

5011. You have not experienced much jealousy on the part of your friends on the opposite side?—There are little difficulties sometimes, because they are inclined to start before we do.

5012. There is a long mill race, is there not?—Yes.

5013. Do you see any difficulty in putting a weir at the head of that mill race, so as to limit the height of the water to which they can draw it from the pond above?—It would shut their head off altogether; you must narrow the channel instead. If you put an obstruction there, you stop their head directly, and you make a fall.

5014. If you have the weir sufficiently long to let the water pass over?—You could not do that.

5015. Have you made observations upon the flood water coming down to your mill?—We are very much flooded there. I think we are rather more hemmed in than we were years ago. Lord Orkney has embanked his land below Maidenhead Bridge, and that throws the water back upon us, and prevents it escaping as it did; it used to go over the land at the corner.

5016. You have more tail water now?—Yes.

5017. You have not observed the velocity with which floods reach you now as compared with former years?—We have a flood quicker now, and it passes off quicker.

5018. (*Chairman.*) What height does a flood rise above your ordinary low-water level?—The tail water rises 5 or 6 feet, or more than that; nearly 8 feet in some floods.

5019. (*Mr. Harrison.*) Whereas the head water would not rise above 2 or 3 feet?—About 3 feet. None of the money that is taken for pleasure boats by the pound lock keepers goes to the navigation. At our lock there is a considerable sum taken which the Thames Commissioners lose altogether

5020. (*Professor Way.*) That is possibly part of the salary of the pound keeper?—Yes; and it is worth a good deal. A small boat takes more water than a barge, and every time it goes through there is that pound full of water wasted for one pleasure boat. This was a serious evil last summer.

5021. It diminished the supply of water to you as a miller?—Yes, and of course for the next barge that came; every little boat kept lowering the water as it passed through. I think there should be some plan of lifting a small boat across. I think if it was lifted up on to a truck, and wheeled to the head, it would be quite as simple as the other.

5022. Is the town of Maidenhead sewered?—No, it is not.

5023. Is there much sewage that escapes into the river from Maidenhead?—No, I do not think there is.

5024. (*Chairman.*) There is, I believe, a local board of health there?—Yes.

5025. (*Mr. Harrison.*) Can you give the actual cost of repairs to the weir for a number of years past, and send it to the Commissioners?—Yes.

5026. For how many years can you furnish such a return?—For 20 years.

5027. Will you be so good as to furnish the Commission at the same time with the length of the weir, the size of the openings of the old lock, and of the flood gates?—Yes.

The witness withdrew.

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The following communication was received from Mr. Towers of Windsor:

SIR, Windsor, Nov. 30, 1865.

I ATTENDED at the Town Hall this afternoon to represent the chairman of the gas company, (being requested by him, as the secretary, to do so and state his inability through bad health to be there himself) when I found the Court had just previously completed the evidence and broken up.

I had merely to state that the company discharge into the sewer none of their solid or liquid products obtained in the process of gas making. All that are not sold on the premises are removed to some place below London for conversion into other products.

Being also the registrar of births and deaths engaged in taking the three last censuses of the Windsor district, I beg to enclose a printed copy of a memorandum I drew up after the census of 1861, (see below) which will show the exact population of the borough at that time. I am induced to forward this paper, as I conceived that Mr. Darvill in his examination on Monday was unable to answer this question with an exactness that would be satisfactory to the Commissioners.

I have the honor to be, &c.

WM. TOWERS.

Some RESULTS of the CENSUS of 1861 for the WINDSOR UNION.

PARISH, DISTRICT, &C.	Separate Families.	HOUSES.			PERSONS.			1851.		1841.	
		Inhabited.	Uninhabited.	Building.	Male.	Female.	Total.	Inhabited Houses.	Persons.	Inhabited Houses.	Persons.
Parish of New Windsor with Dedworth	1,579	1,139	67	5	3,330	3,398	6,728	1,038	6,554	1,041	7,559
Military included in the above numbers	—	—	—	—	494	43	537	—	666	—	960
Parish of Clewer	1,144	906	46	35	2,681	2,733	5,414	666	4,364	581	3,913
Military included	—	—	—	—	328	48	376	—	400	—	386
Ecclesiastical District of St. John's, Windsor	1,523	1,099	62	5	3,223	3,310	6,533	1,005	6,414	—	—
Military included	—	—	—	—	494	43	537	—	666	—	—
Ecclesiastical District of Holy Trinity, Windsor	595	435	26	30	1,602	1,453	3,055	365	2,882	—	—
Military included	—	—	—	—	328	48	376	—	400	—	—
Ecclesiastical District of St. Andrew's, Clewer	605	511	25	5	1,186	1,368	2,554	334	1,622	—	—
Municipal Borough of Windsor:											
In-Ward	627	447	23	20	1,277	1,377	2,654	457	3,049	517	3,795
Military included	—	—	—	—	49	—	49	—	48	—	44
Out-Ward	1,537	1,129	68	15	3,666	3,503	7,169	956	6,513	884	6,567
Military included	—	—	—	—	822	91	913	—	1,066	—	1,346
Total Parliamentary and Municipal Borough	2,164	1,576	91	35	4,943	4,880	9,823	1,413	9,562	1,401	10,362
Military included					871	91	962	—	1,114	—	1,390
Old Windsor							1,835	—	1,785	—	1,600
Inmates of the Union House included							255	—	—	—	—
Sunninghill							1,596	—	1,350	—	2,062*
Egham							4,864	—	4,482	—	4,448
Thorpe							552	—	555	—	532

The Upper and Lower Wards of Windsor Castle return 308 inhabitants. The hamlet of Dedworth 195.

* The return for Sunninghill in the year 1841 included 536 visitors at the Ascot Races, which accounts for the great excess of that year over the succeeding returns.

Six persons were returned as sleeping in barges within the parish of New Windsor.

Kingston, Tuesday, 12th December 1865.

PRESENT:

ROBERT RAWLINSON, ESQ., C.B., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

KINGSTON.

Mr. J. East.

12 Dec. 1865.

Mr. JOSEPH EAST (of Kingston) examined.

5028. (*Chairman.*) Have you recently been elected Mayor of Kingston?—Yes.

5029. Is this the first year of your office?—Yes.

5030. How long have you been resident in Kingston?—For 19 years.

5031. Are you engaged in any business?—Yes, I am a brewer.

5032. Do you use Thames water?—No.

5032*a*. Can you state what the population of Kingston is now, taking the municipal area?—I do not know that.

5033. Are there manufactures carried on at Kingston?—No.

5034. Are there breweries besides your own?—Yes.

5035. Are there mills near the brewery?—Yes, a corn mill, and a mill that is used for preparing cocoa-nut fibre to make brushes, the other mill is for crushing seed.

5036. Is there navigation to and from Kingston by the Thames?—Yes, by barges.

5037. Do they come principally from London?—They come here principally from London now; formerly the river was the highway to Bath, Bristol, and Oxford, and was used very extensively.

5038. Has that part of the navigation fallen off

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since the railways were introduced ?—Yes, the up river navigation.

5039. Has the down river navigation diminished since the introduction of railways ?—Yes.

5040. Do you trade upon the river in connection with your own business ?—No, I receive a supply of coals direct in that way.

5041. You do not send beer down to the pool ?—No.

5042. Do you brew much for exportation ?—None.

5043. Do you know whether Kingston is sewered or not ?—It is.

5044. Your surveyor will probably tell us. is he present ?—We have been unfortunate in that respect, the surveyor has recently died, and another has just been appointed.

5045. Are there old sewers in existence ?—Yes.

5046. Do you know where the refuse of the town is discharged ?—Into the Thames.

5047. Proceedings in chancery have been taken against you by the Thames Conservancy ?—Yes.

5048. Because, as they allege, you proposed to carry the sewage into the Thames ?—Yes.

5049. Has that resulted in stopping the works which you had commenced ?—No, they are completed as nearly as possible.

5050. Where does the sewage go to from the new works ?—Into the Thames.

5051. Has the propriety of utilizing the sewage and putting it upon the land been discussed in the town council ?—It has been considered a great many times by the drainage committee of the town council.

5052. Have they considered that matter since the proceedings in chancery ?—No, it has not been taken special notice of.

5053. Have you paid attention to the question of the application or utilization of sewage?—Whenever I have seen anything bearing upon the subject I have paid attention to it to see what might be brought forward as an improvement upon the present mode of getting rid of our sewage.

5054. Have you seen the works at Croydon ?—Yes, but that was some time since. I think Mr. Wilkinson will be able to give you better evidence as to that.

5055. Have you adopted the Local Government Act at Kingston ?—No, we have a special Municipal Act.

5056. Are you acting then with regard to your sewerage under a private Act ?—Yes, the Act was obtained in 1855.

5057. Was the incorporation obtained then ?—There was an extension of the powers of the corporation.

5058. By a private Act ?—Yes.

5059. Is the Thames used much in this neighbourhood for pleasure and boating purposes ?—Yes.

5060. Are the pumping stations of the waterworks companies for the supply of the metropolis above or below Kingston ?—They are above the outfall of the sewage.

5061. Have you paid much attention to the river to ascertain whether the operation of pumping has made any difference to the state of the river in dry weather ?—It has certainly reduced it.

5062. It has diminished the volume of water ?—Yes.

5063. Has the diminution been very perceptible ?—I think not.

5064. The last summer was very dry ?—Particularly so.

5065. Did you suffer inconvenience in the navigation from the scarcity of water in the river ?—None that I have heard or read of.

5066. Have complaints been made as to the diminution of the water for pleasure purposes ?—None, to my knowledge.

5067. Is the river different in its character from what it was when you first knew it ?—No.

5068. You do not see any difference ?—No.

5069. Is there a water company in Kingston ?—Kingston is supplied by the Lambeth Waterworks Company.

5070. Are you quite satisfied with the water supplied by them ?—At times, when the river is turbid, the water is very thick.

5071. And discoloured ?—Yes.

5072. Does the tide reach as high as Kingston, or does it reach only to Teddington lock ?—It ceases at Teddington lock, a mile and a half below Kingston.

5073. And below the point at which the water companies take their water for the supply of London ?—Yes.

5074. Is there a mill at Teddington ?—No ; there is a weir and a lock, so that it is a continuous stream at Kingston. Up to Teddington lock there is an ebb and flow.

5075. There is a continual downward current to Teddington lock past Kingston ?—Yes.

5076. Do you know what volume of water the water companies take out of the Thames ?—No, I do not.

5077. Is there ever, that you are aware of, a cessation of the flow over Teddington lock ?—Never.

5078. The water is always flowing over ?—Always.

5079. Then any refuse that you pass into the Thames cannot be thrown back again upon the companies ?—That cannot possibly be so.

5080. It all goes down ?—Yes.

5081. Is there any fishing in the river opposite Kingston ?—Yes, and there is an abundant supply of fish.

5082. Have you gasworks in Kingston ?—Yes.

5083. Are they situate on the banks of the river ?—Not immediately.

5084. Is refuse passed from those gasworks into the Thames ?—Not that I am aware of.

5085. Have you heard complaints made of the fish being killed or injured by anything being passed into the Thames ?—Not that I am aware of.

5086. You have not heard that sewage is injurious to the fish ?—No.

5087. Is there much bathing in the river in this neighbourhood ?—That is below principally.

5088. Have complaints been made as to the condition of the water for bathing purposes ?—No.

5089. Do you think the Thames could be improved by any means, so as to make it more suitable for commercial purposes ; do the boats ground at any time when they get past Teddington ?—No, I never heard that they did.

5090. Do steamers come up to Kingston ?—Yes, they go to Hampton Court in the summer on pleasure trips.

5091. They come through Teddington lock ?—Yes.

5092. Have you any further remarks to make in relation to any matter connected with this inquiry ?—Nothing occurs to me just now.

The witness withdrew.

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Mr. WALTER MEACOCK WILKINSON (of Kingston) examined.

5093. (*Chairman.*) You are a solicitor and town clerk of Kingston ?—Yes.

5094. How long have you been town clerk ?—Between three and four years.

5095. Is Kingston an ancient municipal borough ?—It is very ancient ; one of the oldest, I believe.

5096. What number of aldermen and town councillors have you ?—The council consists of 32, and of that number eight are aldermen.

5097. Have you a private Improvement Act ?—Yes.

5098. Of what date is that ?—It was passed in 1855, and intituled "The Kingston-on-Thames Improvement Act of 1855."

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5099. That is your most recent Act?—Yes.

5100. Does that act empower you to make sewers and drains?—It incorporates the "Towns Improvement Clauses Act," which does so.

5101. And any of the clauses of the "Public Health Act"?—No.

5102. Nor of the "Local Government Act"?—No; the "Towns Improvement Clauses Act," the "Commissioners Clauses Act," and other Acts. The "Commissioners Clauses Act" merely provides the means.

5103. Have you found no difficulty in governing the town under the "Improvement Act"?—No; we have power to make byelaws.

5104. How many railway stations are there at Kingston?—Within the borough there is but one; the one at Surbiton is out of the limits of the borough.

5105. And Surbiton is not within the borough?—No.

5106. What becomes of the sewage of Surbiton?—That sewage is discharged into the Thames.

5107. Is it carried through your sewers?—No, independently.

5108. Does it pass through an old watercourse, or an artificial sewer?—There is a recently constructed sewer.

5109. Does the frontage of Surbiton go down to the Thames?—Yes.

5110. What are the names of the places immediately adjoining you?—In one direction we have Thames Ditton, Long Ditton, and Esher; in another direction we have Tolworth, Hook, and Chessington. They are small places. In another direction we have Malden, and passing round we come to Ham and Richmond. That would form the area on this side of the water.

5111. Hampton Wick is near to you?—Yes; that is on the other side of the water.

5112. Is Hampton Wick sewered into the Thames?—I do not know. The surveyor of that place is here.

5113. Is there much population at Teddington?—Yes, there is an increasing population there decidedly.

5114. Is the population increasing at Twickenham?—I should apprehend so.

5115. Then there is Ham Common?—Yes.

5116. Are those places sewered?—Not for their sewage; I believe only for surface water.

5117. Does that pass into the Thames?—Yes,

5118. Is Petersham a village?—Yes, it lies between Ham and Richmond, and is a small place.

5119. Then there is Isleworth?—That is a considerable distance from here.

5120. May I take it that the population is generally increasing upon the banks of the Thames from Richmond to Thames Ditton?—I should say so.

5121. And Hampton more or less?—Yes.

5122. I suppose estates are being brought into the market for building purposes?—Yes, in this neighbourhood.

5123. (*Mr. Harrison.*) What is the subsoil upon which Kingston is built?—I believe it is chiefly gravel.

5124. Do you know to what depth gravel extends?—I do not, but the subsoil abounds with land springs, and is porous in consequence.

5125. To what depth have the deepest of your sewers been put in?—Many of them are 12 or 16 feet deep.

5126. At that depth what is the substratum?—I believe it is gravel.

5127. How was the sewage dealt with before those sewers were made?—I could give you that information from the evidence in the suit with the Thames Conservators in which we have been recently concerned; we had statistics of the exact number of houses taken that were drained, and the means by which each was drained. All this information will be found in the appendix to the proceedings in chancery. I can refer to it if you like, but I believe the Commissioners have a copy.

5128. From what you remember, was the greater part of the sewage carried into cesspools?—I believe it was; a great part of the sewage was discharged by cesspools alone. Another part of the sewage was discharged by cesspools with overflow drains that communicated with the Thames. The remainder was discharged direct into the Thames. The exact proportions we got at by actual survey, and all that appears on the proceedings.

5129. How is your town supplied with water?—The town is supplied by the Lambeth Waterworks Company. Their mains are laid through the town, and passing through the town they supply us with water.

5130. Is that water filtered at the works?—Yes, at Seething Wells.

5131. Is the whole of the water that is used by the town supplied from that source?—I am not aware of any other company.

5132. There is a pump near the church which, I was told, supplied a large district?—We have plenty of water in local wells sunk in the subsoil, we get a great deal from there.

5133. Is the water from the wells of good quality?—Yes, I believe of very good quality, indeed of the best quality; it comes down from the springs at Combe, which are noted springs, and which supply Hampton Court Palace; they are the springs that Cardinal Wolsey selected.

5134. How long has Surbiton been drained into the Thames?—I do not know, I imagine that it has always been drained into the Thames.

5135. I thought there was a regular system of sewerage carried out there?—Yes, there has been a system of new sewers adopted and carried out two or three years ago through the old outfall, but it was a mere enlargement of that which had previously existed.

5136. The houses in Surbiton are superior to those in most towns, are they not?—Yes, most of the town consists of residential property of a good class.

5137. (*Chairman.*) In the proceedings before Vice-Chancellor Wood what points were gone into in the evidence?—The volume of water coming down the Thames was gone into.

5138. Was there any question with regard to the navigation or embanking the Thames?—Not exactly. It was alleged that the discharge of sewage might be such as to interfere with the navigation as being unhealthy to parties navigating the river.

5139. Was anything said as to causing impediments in the river?—I do not remember that any point was taken as to that, it was simply as to its being unhealthy to persons navigating the river.

5140. Have there been discussions as to the advisability of ultimately applying all the sewage to agricultural purposes, or disinfecting it?—Yes, there have been at the outset of the proposal for a new scheme of drainage; the matter has been discussed.

5141. Who devised your scheme of sewage?—Mr. Despard; he was in Mr. Beardmore's office, but he has since died.

5142. Did you let your work by contract?—We did.

5143. Has it been completed since the suit?—It was never stopped at all. It was going on the whole time, and it has been going on ever since.

5144. Do you now consider that it is completed?—Yes.

5145. You are out of the hands of your contractor?—Yes, quite so. We have not finally settled with him.

5146. Are you now progressively carrying out your house drainage?—We are.

5147. Of course it is your intention to go on and complete the house drainage?—Yes; it is not being done compulsorily.

5148. You permit persons to communicate who ask to be allowed to use the sewers?—Yes, on certain terms, provided they make their connections in a proper way, with proper gullies and traps.

5149. (*Mr. Harrison.*) What proportion of the houses in the town have been connected with the sewers?—I think, since the new works have been constructed, there have been about 60 new houses connected.

5150. Out of how many houses?—I will furnish you with that.

5151. (*Chairman.*) Gas is supplied to the town by a private company?—Yes.

5152. Do you contract for the public lamps?—Yes.

5153. Have you an inspector of nuisances under the corporation?—Yes.

5154. Is he a member of the police force or an independent inspector?—He is independent of the police.

5155. Have you any officer of health?—No.

5156. Does the inspector of nuisances make reports to the board?—Yes; they come generally under the Police Acts. He makes a report of general matters once a fortnight, and he acts with a sub-committee, who assist him in his duties.

5157. With regard to covered cesspools, have you had any special inquiry made as to the parties who may be inconvenienced, or do they simply make application from time to time?—That is the ordinary course.

5158. Have you no record of what private cesspools may exist within the town?—We have a record now; we know what cesspools there are undoubtedly, because we know from the inquiry that we made some little time back how each house drains.

5159. You made a house to house inquiry?—Yes; we made a survey.

5160. And drew up a record which shows the number of cesspools and how each house drains?—It shows how each individual house drains.

5161. And that record appears upon the face of the chancery proceedings?—Yes.

5162. Do you know what the value of agricultural land is within a moderate distance of Kingston. Have you been concerned in the sale of lands, so as to know their value?—The value varies very much—from 500*l.* to 1000*l.* an acre, and even more.

5163. Have there recently been sales of purely agricultural land within a short distance of Kingston?—I know of none.

5164. (*Mr. Harrison.*) Can you tell the probable value of purely agricultural land towards Teddington to which the sewage would be likely to be carried?—There is very little agricultural land there.

5165. On this side of Teddington lock I have observed a large space open?—Yes.

5166. (*Chairman.*) Is there not more on your side of the river than on the opposite bank?—Yes.

5167. (*Mr. Harrison.*) Is the value of land affected by the towing-path being on this side of the river?—I think not. I do not think you will find much agricultural land, or land suitable for the application of sewage, until you get beyond Tolworth.

5168. (*Chairman.*) How far is that from Kingston?—It is about a couple of miles, and then there is a good tract of country. Tolworth is in an opposite direction, and away from the river inland.

5169. What is the rateable value of the borough?—The net assessed rental for 1861 was 32,268*l.* 10*s.* 0*d.*; in 1862 it was 39,833*l.*; in 1863 it was 43,171*l.* 15*s.* 0*d.*; I think it is now about 50,000*l.*

5170. What amount of borough debt is owing; did you borrow the money for the sewering?—Yes. We owe a debt of 8,000*l.* and odd for sewering.

5171. Then the total amount of your debt is 8,000*l.*, and that is owing for the sewers?—Yes. It was 10,000*l.*, but it has been reduced. I think it now amounts to 8,600*l.*

5172. You have arranged gradually to pay it off?—Yes, we have arranged to pay it off over 30 years.

5173. (*Professor Way.*) What proposal has been under consideration at Kingston for the disposal of the sewage other than turning it bodily into the river?—The first proposal that the corporation thought might meet the requirements of the neighbourhood and save the river was to connect our outfall with the main metropolitan sewer. If you will allow me I will just read the correspondence that took place between me and Mr. Bazalgette upon that subject in 1862. I wrote to him in these terms on the 10th of September 1862. "I am instructed by the committee appointed by the Town Council of this borough to consider the best mode of improving the drainage of this borough, to request from your board information upon the following subject, viz.: In the event of the low level sewer being extended from Putney to Kingston-on-Thames, what will be its depth at a point 300 yards north of Kingston Bridge, what will be its depth at Putney, and the fall between Kingston and Putney. Also what will be the size of the sewer at Kingston-on-Thames?" That letter was addressed to the Drainage Committee of the Metropolitan Board of Works. Our object was if possible to have saved the Thames from all pollution by connecting ourselves with the main low level sewer.

5174. (*Mr. Harrison.*) How far have they carried the main low-level sewer now?—It extends to Putney.

5175. (*Professor Way.*) Do they contemplate carrying it further up the river?—No; I believe they have no power to do so.

5176. Do you propose to connect your outfall with that sewer?—Our desire was to construct our sewers in such a mode as to be able to do so, ascertaining beforehand what the level would be, whether it would be carried on from Putney, and if so, what the size of the sewer was to be, in order, if possible, that we might so make our sewer that at some future date it might be connected with their sewer; I received an answer to my letter, dated 22nd of September 1862, in these terms: "Absence from town prevented me replying to your letter of the 10th inst. sooner; it is not intended to extend the Metropolitan low-level sewer for the drainage of any portion of the district beyond the Metropolitan area, nor could this be done under the present Act of Parliament. The drainage works are designed for the Metropolis alone, and therefore this Board has, on application from other parties, shown a disinclination to extend that area; the level of the low-level sewer at High Street, Putney, is about three feet below Trinity water mark, and its fall eastward is at the rate of 4 feet per mile; but for the reasons above stated I am unable to reply to the other questions; any information or assistance I can give you I shall be happy to afford.

"(Signed) J. W. Bazalgette."

5177. You understood that to mean that the Metropolitan Commissioners would not give you an outfall into their sewer?—Yes; I understood that to mean that there was no chance of the sewer being extended to this district at all, and therefore it was of no use making any arrangements to connect with it.

5178. You did not propose to carry your own drainage down so as to connect with their district?—We could not go into that district; we should require an Act of Parliament to enable us to do that.

5179. In the absence of such a connection, what do you propose to do with your sewage?—We have considered various means of dealing with it, deodorization, defecation, or otherwise, and a deputation from the corporation to inquire into the subject visited various towns; Cheltenham, Leicester, Uxbridge, Morpeth, Newmarket, Rugby, Taunton, Watford, and Tottenham; I do not think they visited all of those towns, but we had correspondence with all of them, and I believe the deputation visited most of them; we also advised with various parties, engineers and others, upon the subject, and I have a letter amongst others from Mr. Harkness, of 40 Parliament Street, who may be known to the Commissioners.

5180. Have you any report founded upon the visits made by that deputation?—There does not appear to have been any written report made on the subject by the parties who visited on behalf of the corporation; they appear not to have gathered any information that was likely to assist us, and so we consulted with our engineer on the subject.

5181. Do you mean that the information they obtained was not satisfactory, or that it left you in a state of doubt?—Yes; it appeared that in some cases

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there had been a complete failure, and in others very unsatisfactory results.

5182. Upon the whole the evidence was against any dealing with the sewage?—Yes; it appeared to the parties who formed the deputation that science was in fact incomplete upon the subject, and that it was unadvisable at present to do anything.

5183. (*Chairman.*) They would find nothing satisfactory at Leicester, Uxbridge, Taunton, Tottenham, Newmarket, Morpeth, or Cheltenham, and nothing very satisfactory either at Rugby or Watford?—No.

5184. (*Professor Way.*) What was the date of those visits?—They were made in the early part of 1863. I mention this to show that our board was desirous of adopting any plan that would be effectual. We first endeavoured to communicate with the low-level sewer, and then, failing that, these various visits were made to obtain information.

5185. Can you state what was the impression made on the minds of the deputation; so far as you could learn was it that those who had tried had failed in any degree to purify the liquid before throwing it into the streams, or that the undertaking had failed commercially?—I think it had failed in both ways. I think the result of their inquiries was that it was impossible so to deodorize the sewage by chemical application as to render it innocuous to the water.

5186. Was it found impossible to effect any important amount of good?—Yes. My belief is that the committee felt it was impossible to take from the sewage its noxious properties by deodorization or defecation, and also, as a commercial speculation, that it was impossible to apply it to the land with any chance of obtaining a profitable income from it.

5187. Did the deputation learn at Leicester that a very great improvement had been made in the condition of the stream?—It is some time ago—I was not with them, and I cannot say—I have a letter here that was addressed to the board on the subject of our system of sewage from Mr. Harkness in these terms—this is the general advice that we have received—"Deodorizing tanks could be erected if necessary, but "until the application of sewage manure is better understood for agricultural purposes, I would not recommend any expense to be incurred in their "construction."

5188. (*Chairman.*) In the event of the Government providing to towns in this neighbourhood a simple means for acquiring a right of outlet into the metropolitan low-level sewer, do you think there would be any difficulty made by Kingston?—I am sure that there would be none. This received the attention of the committee after they had appointed a special engineer of their own. The matter was then referred to the engineer, and in his report on the subject he says—"It must be carefully borne in mind "that in all probability at no distant period it will become absolutely imperative upon all towns on the "banks of the Thames above London to afford such "means as will effectually preserve the river from "pollution. This can only be effected by intercepting "the sewage and treating it by deodorization and "other processes so as to render the fluid portion innocuous before discharging it into the Thames, or "by converting the whole to agricultural purposes. "And as the same obligation would equally affect the "districts adjoining your borough, it would unquestionably be more economical to combine in the construction and the maintenance of pumping stations, "reservoirs, and deodorizing works—for it will be "readily understood that two or more adjoining districts may together construct such works and maintain them at much less cost than if each carried out "and maintained separate works. The cost in the "former case would of course be assessed according "to the benefit received—thus, the drainage of "Thames Ditton and Surbiton might by a small "pumping station be lifted into the Kingston system, "and the whole be deodorized in a convenient locality "below the town, or otherwise be carried if necessary "to below Teddington lock, in which case the sectional area of the southern part of the main outfall "sewer may be enlarged to the required extent to "receive the additional sewage, without for a day interrupting the Kingston drainage, by building a new "crown to the sewer as shown in the marginal sketch. "The cost would of course be a matter of arrangement. Thus it will be seen that the plans adopted by "the corporation will meet all the requirements of "the borough present and remote."

5189. The Thames in nearly every portion of its distance on both sides from Kingston to Putney and Fulham is more or less used for building purposes?—It is.

5190. If an intercepting sewer could be provided at the cost of the entire district to join on to the metropolitan low-level sewer, do you think that you would avail yourselves at Kingston of that means of outlet, so getting rid for ever of your sewage?—I am sure that the corporation would be delighted to have an opportunity of doing so on any reasonable terms.

5191. And they would contribute their fair share of the necessary cost to accomplish that object?—I am sure of it.

5192. The towns above, from Thames Ditton, upwards must also be compelled to join, if necessary, in the same scheme?—Yes.

5193. The question as to whether there should be one continued line of outlet, or whether there should be any other mode of freeing the Thames from pollution, would be a question for after consideration?—Exactly.

5194. I suppose you considered it at Kingston rather a hardship upon you to be taken single handed into the Court of Chancery when the matter concerned all other parties resident on the banks of the Thames as well as the people at Kingston?—Yes, that was our feeling. It seemed to us that we were merely made the scapegoats, and with no object, because the mere stopping of us could not stop other people, and it was stopping our only means of drainage without providing us with any substitute.

5195. I suppose that you are not at Kingston doing any more than is done at Richmond, Petersham, and all the other places on the banks of the Thames?—No, and with regard to the amount of sewage, Richmond is larger in point of population than Kingston is, and Richmond of course, as you are aware, discharges its sewage into tidal water with very much less advantage than Kingston can do, as at Kingston there is always a large volume of water to carry it off.

5196. The sewage of Richmond, being discharged into tidal water, is washed backwards and forwards in the way that was found so very objectionable in the case of London?—Yes, and it is discharged very often at low tide.

5197. (*Professor Way.*) The complaint against you, I think, was not as to what you had done already, but what you proposed to do?—What our opponents said was this: if you discharge all your sewage into the Thames, you will create a nuisance, but it was only a nuisance in apprehension.

5198. That was the form that the case took, was it?—Yes.

5199. Were you not situated differently from Richmond and other towns, which did not propose any new or larger outfall?—We are differently placed in this respect, that we were going to do it, whilst they were actually doing it, but we could show that we should not discharge more sewage than those towns. We could point to them as examples of what we should do when we had carried out all we intended to do.

5200. Are there any powers by which the different towns on the Thames could combine to carry out a general system of drainage?—No, it would require legislation.

5201. (*Chairman.*) Did you see the bill that was brought in last session by Lord Robert Montague?—Yes, and I have a copy of it here. The "River Waters Protection Bill."

5202. Would that at all assist you?—The pro-

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visions of the bill are very complicated. I do not know, and perhaps one did not give so much consideration as one ought to have done, the bill was so soon withdrawn.

5203. What did your chancery proceedings cost you ?—I think some 500*l.* or 600*l.*

5204. If all your neighbours were proceeded against in like manner, I suppose they would be subjected to something like the same amount of costs? —Yes.

5205. And I suppose you would rather have expended that money in executing some good work ? —Yes, but we were quite stopped from the consideration of anything by the way in which we were dealt with when we were made a mark to be fired at. We had done all we could, and we had endeavoured by enquiries and other means to ascertain what was best to be done. We were bound according to our Acts of Parliament obtained some years ago to do this. The Public Health Act was directed to be introduced here, and it was only in consequence of our old "Improvement Act" being carried in 1855, by which we were authorized to adopt the "Towns Improvement Clauses Act," and to carry out an efficient system of drainage that the other act was withdrawn. We were virtually pledged as a public body to carry out the drainage of the town, which we were going to do.

5206. Was there ever an official inquiry conducted in Kingston by any person from the Board of Health? —Not that I am aware of.

5207. (*Professor Way.*) I suppose we may take it for granted that the law documents which have been referred to before us may be taken as evidence ?—Yes, I think you will find that the most convenient course.

5208. I observe on referring to them, that a very strong opinion was entertained by some of the witnesses on the part of the corporation of Kingston, that the weir at Teddington would not in any way increase the evil of the sewage outfall from the town of Kingston, because of the flow of the water ?—Yes, we said so. It was alleged on the part of the Conservators that the weir would back up the water , and render it a sluggish stream above. On the other hand it appeared to the witnesses on our side, that it would provide what was considered to be a great desideratum, viz. : that there would be always a deep stream into which to discharge the sewage.

5209. You are aware that sewage consists of two classes of matter ; matter dissolved in water, and matter which is not dissolved in water ?—Yes.

5210. The undissolved portions are solid animal matter, which is liable to undergo decomposition and change ?—Yes.

5211. Do you not think it is probable that any subsidence that would occur in consequence of an obstruction in the river, would cause an accumulation of those solid matters above that weir ?—It might do so, but it appeared to me, from my investigation of the subject, that it was merely a question of proportion, that is, the proportion of the volume of the stream to the proportion of the sewage. The opinions that were given to me in getting up the case, were, that the sewage became offensive in point of contamination and nuisance when it approached a certain proportion in relation to the volume of the stream ; and that proportion was given to me as being 1 in 20, and in the case of Kingston and its population, the proportion could never approach anything near that amount.

5212. Supposing we take it for granted that there are two kinds of matter, one of which separates itself naturally from the other by subsidence, would not that accumulate in an overflow pond, which you may take the reach of the river above the weir to be, and would not that operation go on so as in course of time to alter the relative proportions you have spoken of between the water and the sewage matter ?—I suppose that in course of time it would be so, but I should think the floods would remove the deposit.

5213. It has been stated I think that the reach above Teddington is very deep ?—Yes, above Teddington it is very deep.

5214. If the water was more or less still, it would be only the upper parts of the water that would flow off, and the reach would be in the nature of a subsiding tank ?—Yes.

5215. That same principle being actually adopted in sewage works in order to effect a separation ?—Yes.

5216. Do you not apprehend that there might be a great risk of annoyance and injury in time from an accumulation of solid matter ?—I am unable to form much of an opinion, I think in course of time it would be so. I believe it was urged on the part of the Conservators, that the solid fœces would float on the water.

5217. It does that repeatedly after it is decomposed at the bottom. It produces gases at the bottom which raise it up to the top, and then it falls to the bottom again ?—Yes, and if I remember rightly it was represented that the decomposition would take place in our own system of sewers, and that the fœces would pass out into the river and float.

5218. Supposing it to be practicable to deal with the sewage as a whole, you are aware that processes of precipitation — however unsatisfactory they may be, either pecuniarily or in a sanitary point of view— do remove a large quantity of that solid matter ?— Yes.

5219. And probably the corporation of Kingston would think it desirable that some such operation should be tried ?—Yes, certainly. In fact interception of the solid matter, we have been told, is really the only practicable thing on which engineers are agreed ; the interception of the solid matter is the only thing that can be practically regarded as an absolute good.

5220. Do you mean by chemical means ?—No, by means of precipitation—by tanks.

5221. But there is nothing before the corporation in the shape of a definite proposal for applying the sewage to the land ?—No, at least when I say there is nothing, there was last year a proposal made and a bill was to be introduced for a land reclamation and a sewage company, it was submitted to the corporation, and the corporation were inclined to fall in with it as far as they could. It was promoted by Sir Charles Fox, and it was intended to render the sewage available for the purposes of the utilization of waste and other lands in the neighbourhood by pumping the same by steam power through iron mains from the metropolitan sewers, and thence distributing through branch pipes and jets over lands to be cultivated. Now there is another proposition by which a company proposes to do something of the same kind—to intercept the whole of the sewage and take it away. Their bill applies to our borough.

5222. (*Chairman.*) May we take it for granted that the authorities of Kingston would fall into any scheme that would at once rid them of a nuisance, and the Thames of its pollution ?—I am sure you may.

5223. Any scheme that was properly devised and was consistent with common sense ?—Yes.

5224. I perceive by a return you have handed in that your rateable value has been increasing in a very large ratio ?—Yes, and that has been a great deal owing to there having been a re-assessment made, the assessment has not been of a stationary character, that is to say, it has been altered by various valuations which have been made during late years, and although it may be taken as having increased, yet still you must not take it as having increased exactly according to those figures.

5225. Is land and building property in Kingston and vicinity, on the banks of the river, increasing in value ?—I should say that at Kingston it is. I imagine that at Surbiton it has probably arrived at its greatest height.

5226. You think that property in Surbiton has been run up in the market ?—Yes, and I think it is not likely to increase in value.

5227. At Kingston and on the banks of the Thames

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generally, property, if it is moving at all, is increasing in value ?—Yes ; but I should say that unless something is done as to the Thames it will not increase.

5228. You mean, unless the Thames is put into a better sanitary condition ?—Yes ; I feel strongly that, unless some measures are taken with regard to the Thames, the river property will not increase in value.

5229. Do you think that in carrying out any method of improving the Thames by abstracting all the refuse from it, either by intercepting sewers or otherwise, it is a landowners' question as much as a question of town property or house property ?—Indeed, I do.

5230. You think that the landowners may be fairly assessed according to the benefit they derive by any improvement that may be effected ?—Yes, I think so.

5231. And that it would not be fair to you and to other towns to compel you to carry out improvements of that kind, and exempt the landowners from contributing to that by which they would be benefited ?—Yes, I think it should be a general scheme covering the whole, and that each party should bear its just proportion, according to the advantage to be derived.

5232. According to the rateable value ?—Quite so.

5233. Supposing you consented for Kingston to combine with other towns round about, and parliament compelled you to incur considerable cost to pass your intercepting sewer through what is now agricultural land, and supposing that you thus improve the value of land on the Thames, which you say, from your own knowledge, is now deteriorating, you will assess that land first only as agricultural land ; but it would be necessary to have power to assess it as building property afterwards ?—Yes, that is how I understand it. I apprehend this would be the view which you suggest: supposing there was a general sewer passing from Kingston and taking in the sewage of Ham and various other parishes, you would say that that parish or parishes should pay their quota according to their present assessment, and then when a re-assessment took place, (and of course the overseers of each particular parish would look after any increase of their assessment, as the property increased in value, and was changed from agricultural to building land,) they should contribute a larger proportion to the general fund.

5234. And the conservators should have power to amend the assessment from time to time and levy a rate upon the amount of that assessment ?—Yes.

5235. If that was the case, the construction of the requisite works would cost a mere trifle fairly divided ? Yes ; and from what I know of the neighbourhood, and from conversation with gentlemen resident here, I believe it would be a very acceptable plan.

5236. If Government would lend you the money at a very low rate of interest, taking as security, the rates, and extending the repayment of the loan, say over 50 years, that would bring the annual rate still lower ?—Yes.

5237. Of what nature was the company with which Sir Charles Fox was connected ; did they propose to take the sewage and deal with it for agricultural purposes on their own account ?—Yes, that I believe was their intention. "It was intended to render the " sewage available for the purposes of the utilization " of waste and other lands in the neighbourhood of " the metropolis by pumping the same by steam " power through iron mains from the metropolitan " sewers, and thence by distributing the same through " branch pipes and jets over lands to be cultivated." The proposal was to establish a company to buy waste lands, and then to take the sewage on to those waste lands.

5238. How did they propose to deal with you at Kingston ; did they wish you to take any risk in the company, or merely to make them a grant of your sewage ?—That was it.

5239. In perpetuity ?—Yes.

5240. At a nominal rent ?—Yes.

5241. (*Professor Way.*) Were the lands specified at all ?—No ; as far as I remember they were waste lands down below Leatherhead.

5242. (*Chairman.*) Have you any further remarks to offer to the Commissioners ?—I am not aware that I have anything to add, but I shall be in attendance upon the Commission from time to time while they are sitting here, and if anything should occur to me I will mention it.

The witness withdrew.

Adjourned till to-morrow at 11 o'clock.

Kingston, Wednesday, 13th December 1865.

PRESENT :

ROBERT RAWLINSON, Esq., C.B., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

THOMAS JAMES NELSON, Esq. (of Hampton Wick), examined.

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5243. (*Chairman.*) You are the City Solicitor ?—Yes.

5244. You reside on the banks of the river at the "Grove," Hampton Wick?—Yes.

5245. How long have you resided there, or upon any part of the Thames?—I have resided in that house for four years and a half.

5246. What length of acquaintance have you had with the river ?—I have been acquainted with it all my life, but I have a very special acquaintance with it now, as I live so close to it; my house is within 35 feet of the actual water of the river.

5247. You live just opposite to Kingston and about 100 yards below the mouth of the Kingston sewer on the opposite bank?—Yes.

5248. Have you noticed any alteration in the Thames for better or for worse?—Very much for the worse. The water in the Thames has most materially decreased in quantity, and its pollution has increased.

5249. You are no doubt acquainted with the great pumping stations for the supply of the metropolis with water?—Yes.

5250. During the last summer have you observed a perceptible diminution in the water ?—Yes ; I think I have never seen it so low as in the last summer and with so little stream in it, which I attribute to the water companies almost entirely absorbing what fresh water comes down the river.

5251. Do you know Surbiton and Kingston ?—Yes.

5252. Do you know anything of the proposed sewerage of Surbiton and Kingston ?—I believe that all the drainage of Surbiton is now discharged into the river at three or four different points, and the whole bank of the river in the summer time on the Surrey side is very foul in consequence of this Surbiton sewage.

5253. And of Kingston also?—Since the Kingston sewage has come into the river, for some distance along the shore there is a thick black sediment, and

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during hot weather in the last autumn, when the nights were cold and the days hot, this sewage sediment smelt very offensively indeed.

5254. Do you know Hog's Mill river?—Yes; that is a small river rising at Ewell, and falling into the Thames almost close to where we are now sitting. I fancy that there are some drains in Kingston connected with it, as its mouth is in a filthy state; it brings down large quantities of dark black matter, and you may see the gas bubbling up from the bottom. I once went up that stream in a boat, but I never repeated the experiment.

5255. Has there been any proposition made to use that water (Hog's Mill) for flushing the Kingston sewers?—I believe that Hog's Mill was one of the sources by which the corporation of Kingston thought they could keep their own sewers free from polluting the river, but as it is totally insufficient to flush what itself brings down, *à fortiori* it could not as it seems to me flush the Kingston sewers.

5256. In your opinion the pollution of the river was greater last summer than you had ever seen it before?—Very much, so much so that I had serious thoughts of discontinuing its use for my morning bath, the water was so dirty during summer time.

5257. Have you a water supply on your side of the river?—Yes; from the Grand Junction waterworks, I believe.

5258. Do you also get some water from wells?—Yes, there is an abundant supply of water from the gravel; the subsoil about there is a sort of sand, and at about six or seven feet down there is an inexhaustible supply of water.

5259. How is your house drained?—Into cesspools.

5260. Do they go into the absorbent gravel?—There is an overflow in case they should get full, but I have had occasion to have them emptied once only; it was rather a matter of precaution than of necessity.

5261. Did you use or utilize the refuse that you took out?—I put it all on the land.

5262. You only do that at intervals?—When I think the cesspools are full.

5263. You have not attempted to make those cesspools tight, or do you consider that they are watertight?—They are brick cesspools.

5264. Are they absorbent cesspools, do they let the water into the subsoil?—Yes; they do let it through the land below.

5265. Have you ever had reason to suspect that they might interefere with the water supply from the pumps?—No, I think that they are too distant, and that it is not possible that they would pollute the pumps. I do not suspect that they do.

5266. Have you had your pump water analysed?—No.

5267. Would you be surprised to find that the pump water was affected?—Yes; I think so in that soil. I think that sand is a most excellent absorbent of refuse, and the cesspool is situate where I think it might be safely left to deodorize whatever might find its way into it. All our village is supplied with wells and cesspools in the same way, with the exception of one drain which comes into the river close to the bridge, and which is a watercourse running from the grand canal in the Hampton Court home park; it is the overflow from that canal, it runs at the back of the houses in Old Bridge Street. They have erected privies and water closets over this drain, and the consequence is that they foul that drain, and that watercourse fouls the river close to the bridge; and ever since I have been a member of the local board of Hampton Wick, I have done my best to get that remedied by having the bay of the river filled in so that the sewage may be taken away by the stream. At the present time it all goes into a corner there, and is a very great nuisance indeed.

5268. I believe that a local board has been formed at Hampton Wick?—Yes, of which I am a member.

5269. What is the population of Hampton Wick?—At the last census it was about 30 or 40 under 2,000; we are now about 2,100.

5270. I suppose you had to obtain special sanction from the Home Office to adopt the Act?—Yes.

5271. Has there been any contemplated sewerage for Hampton Wick?—There are no means of getting rid of the sewage except into the river. I object to it going into the river.

5272. At Hampton Wick you are in the same difficulty that they are in at Kingston?—The people at Kingston I think may get rid of their sewage easily without polluting the river.

5273. How do you think the Kingston people might do it?—I have thought that Ham Common fields, which are about half a mile below Kingston, might be purchased, compulsorily if necessary, by the corporation of Kingston, that they might take their sewage to those fields and have there a pumping station, and distribute the sewage over those fields which have a sandy soil, and the watery matter would find its way through and into the river. The soil would be immensely benefited by the fertilizing qualities of the sewage.

5274. Who owns those fields?—I do not know; they are called "Ham Common fields." They lie away from any houses, and without any immediate prospect, I should think, of any building taking place on them. There is more land to be built upon before them, and as they lie at a considerable elevation above the river, they seem to present the very thing that could be desired to drain this town. If it was found practicable and such a scheme was carried out, I should very much like to see the sewage of Hampton Wick conducted there too. At Ham, where there is a local board, they are in considerable difficulties as to dealing with the sewage matter. If, however, the sewage of Kingston and Hampton Wick was sent there the expense of a pumping station distributed over the three places would be very much less than if each paid for itself. Ham Common fields are about half a mile below Kingston on the banks of the river; Ham Common is a different place.

5275. Ham Common fields belong to Lord Dysart, do they not?—I do not know.

5276. Is it a fact that land on both sides of the river is becoming every year more and more valuable for building purposes?—Not the particular land that I speak of, because the towing-path runs between it and the river. Land like mine that goes down to the river without any right of way in front is, of course, almost of priceless value, because there is so little of such land in proximity to London. I do not know where you can go and find a spot like it; but on the other side of the river where the towing-path is between the land and the river there is always an objection with regard to residences, because people cannot get to the river. The bargemen and horses going by destroy the privacy of the place.

5277. It is not so advantageous as on the opposite side, where a towing-path does not exist?—No; there are residences from Hampton Wick down to Isleworth, but they do not extend beyond Hampton Wick because the land is the property of the Crown, it is the Home Park.

5278. If the sewage of a large number of houses proves a nuisance, in a certain degree, does not the sewage of one house affect the river in its proportion?—No doubt; it is entirely a question of degree, but the sewage of one house is scarcely perceptible in the Thames.

5279. If you take a thousand separate and detached houses, although not forming a town, the volume of sewage passed into the river will be equivalent to the sewage from a thousand houses composing a town?—No doubt; but if it were distributed over a large frontage area I do not think that the sewage from one thousand houses along a large tract of river would ever attract attention; it is when it comes in its concentrated form that one sees it.

5280. If a scheme is to be introduced for purifying the river, do you not think such scheme ought to embrace the absolute purification of the river, as

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far as it is practicable?—I think that the purity of the Thames, both as a matter of health to those who reside on its banks and as a source of rational enjoyment to the population, is a subject of the first importance.

5281. What is the area of your property at Hampton Wick?—About two acres.

5282. (*Mr. Harrison.*) Is there not a large extent of land between Hampton Wick and Teddington that is unoccupied?—Yes, there is a back water called the Trolack which leaves the Thames about a quarter of a mile below Hampton Wick and runs nearly all the way down to Teddington weir. Of course the frontage of the land would be to that backwater, and that would not afford so desirable a residence as if it were on the main body of the river. That I think accounts for that land remaining unoccupied as a site for residences.

5283. Do you think it is likely to continue unoccupied?—I think not; the neighbourhood between Twickenham and Hampton Wick will in the course of a very few years become one continuous town.

5284. Is there not land to be obtained there for the purpose of applying the sewage of Hampton Wick?—I think not, because all the land has been reserved for building purposes; but that is hardly the reason why our board have not contemplated dealing with their sewage in that way. The expense of a pumping station would be out of proportion to our population and resources.

5285. (*Chairman.*) Suppose any general scheme should be introduced by a board having competent authority from Parliament, do you think there would be any hardship in rating the property on both banks of the river in proportion to the benefit received?—I hardly understand what you mean by "the property so benefited."

5286. Supposing Parliament were to determine that the Thames should no longer be fouled with sewage but that it should be kept out of it; in your case, for instance, it would be a great hardship to call upon you and the Hampton Wick people to deal with your sewage and leave all the people above you and below you without any such responsibility. It would in like manner be a great hardship upon the people of Kingston to call upon them to deal with their sewage and not to meddle with Richmond, or Petersham, or Isleworth, for although the volume may now be not very great, yet, as you say, these places are all likely to increase?—I think that the whole drainage area included by any scheme of intercepting sewage may be fairly asked to contribute to the expense.

5287. Land as well as the towns, that is, all land likely to become building property and drained by the Thames?—Yes, because in time such land would want drains, and therefore should contribute towards the expense. The drainage upon the Middlesex bank of the river, between Hampton Wick and Twickenham, will be a serious affair. It is flat ground, and is being carved out into streets as rapidly as it can be. Not only on the Kingston Bridge line but on the Thames Valley line houses are being built, and outlet drainage must be provided for them. I saw only last Saturday that a deep drain of some kind was being put in, and I have the strongest suspicion that its ultimate destination is the Thames, for there is an ancient watercourse that has been covered over, "Strawberry Vale."

5288. Do the Conservators of the Thames exercise any jurisdiction over Hampton Wick? Have they interfered with you?—Not at all. I believe the Conservators of the Thames are convinced our board does not desire to foul the river; the only proposal we have laid before them was to benefit the river by putting the sewage in a place where it would be taken more rapidly away. Our sewage has gone into the river ever since there have been houses on its banks. There are only, I think, about 20 houses altogether at present.

5289. I suppose the Conservators would have power to take proceedings against you if you proposed to discharge any fresh sewage into the river, as they did against the Kingston people?—No, because the Kingston people not having had a system of sewerage in their town, proposed to construct, and did construct, a system of sewerage, and then to send the sewage into the river.

5290. They proposed to do it?—They proposed, and now they have commenced to send it. But at Hampton Wick we do not propose to send into the river the drainage of a single additional house that does not already go there.

5291. (*Mr. Harrison.*) In any extension of Hampton Wick will you carry out a system of cesspools?—No; Hampton Wick cannot be extended, for nearly all the land in that parish is covered with houses. The rest of it belongs to the Crown and consists of two parks, Hampton Court and Bushy; and therefore the population of Hampton Wick will always remain much as it is now.

5292. How is Hampton sewered?—I cannot tell you; but there is a sewer that goes into the Thames at Hampton Court which drains the Palace and a few houses there.

5293. Is that at a point below the waterworks?—No; it is above the waterworks. It comes in under or close to the water gallery at Hampton Court Palace.

5294. Is there not a considerable population growing up about Thames Ditton?—Yes.

5295. How is Thames Ditton sewered?—I do not know.

5296. Is the river, in your opinion, in a worse condition than it was formerly?—Infinitely worse. I have seen islands below Richmond Bridge, as I pass over the river in the train, continually growing, as it were, out of the water.

5297. Have you paid attention to the floods that come down the river?—Yes; we have some extent of floods here, but not much to complain of. I think the river Mole is the principal cause of the river swelling, as far as this neighbourhood is concerned. It comes through a very hilly district, and of course the rain very rapidly finds its way down from the hills into the Mole, and causes our river here to swell with great rapidity. Twenty-four hours after a heavy fall of rain the river rises, but it runs off unless the country higher up, at Oxford for instance, has got the meadows covered, then it sometimes floods our part.

5298. Mr. Leach, in his evidence before the Select Committee says, "I believe that the smallest quantity "which fell over Teddington weir in the dry season "of last year in one day was about 380,000,000 of "gallons after the water companies had taken their "supply."—I do not think he could have said that this summer. This has been a very dry summer, and during a great part of the month of July the stream was so small that it was almost imperceptible, and in rowing a boat you did not feel the difference as to which way you were going. It was like being on a canal.

5299. (*Professor Way.*) If that was so, the companies would have been pumping out as much water as was coming down?—I am sure they were on that occasion. I may add also that I have never seen the weeds so luxuriant as they were in the last summer, nor have I seen so many of them, and I attribute that to the extra manuring which they received from the sewage of Kingston. The weeds almost just above and below me came right across the river, and it was a matter of common observation that the weeds were particularly luxuriant this year.

5300. (*Mr. Harrison.*) Did you observe that the water was lower this year than it was last year?—I think it was about half a foot lower than the ordinary summer level.

5301. Do you think there was less water coming down the river this year than there was last?—Yes.

5302. That does not correspond with the information we received higher up the river.—I am confident that we had less. I can speak most positively upon

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that point to there being almost still water in the Thames about me during the last summer.

5303. (*Chairman.*) I believe a steamer comes up to Kingston ?—We had this summer a steamer started to go to Hampton Court.

5304. Have you noticed opposite your property any carcases of dead animals, dogs or cats, floating on the surface ?—Very few ; now and then one sees something offensive in the river.

5305. Do you know whether it is the duty of any persons to cleanse the river ?—No ; if I see anything off my place I give it a push on.

5306. Is it the duty of any person or persons to cut the weeds ?—It is not. I make it a rule to send my gardener out when they are of sufficient height, to mow them down, but I am sorry to say that my neighbours do not follow my example ; if they did the river would be a little cleaner.

5307. In the event of any improved system of conservancy being introduced, should it not be one of their duties to scavenge the Thames and keep the weeds down ?—I think they might ask the riparian owners to do it. It is a small matter for each man to do.

5308. The same as in a town in cleansing the streets, each person has to remove snow from the front of his own door ?—Yes ; the weeds only want mowing once or twice during the summer, and most of us that live on the river keep boats and punts.

5309. (*Mr. Harrison.*) Do you think that Ham, Hampton Wick and Kingston, might combine to carry out a system of irrigation with the sewage on the Ham Common fields ?—As far as this neighbourhood is concerned I see no difficulty in taking all the sewage out of the river on to those fields, supposing there were no engineering difficulties in the way, and Surbiton could come into it also ; I intended to include Surbiton ; whether Thames Ditton could I hardly know, but I am afraid there is a long intervening tract ; but after all I do not think there would be any difficulty about Thames Ditton and Moulsey as well.

5310. Do you think there would be difficulty at Moulsey in getting land adjoining for irrigation ?—Yes ; I think Moulsey is very flat. I am afraid the land is so low that they could not get rid of the water.

5311. There would be no difficulty because of the land being built upon ?—No ; but the level of the land at Moulsey is so low that I am afraid they would not get a sufficient fall to the river. Ham Common fields lie above the river.

5312. (*Chairman.*) Do you know the present constitution under which the present Conservators of the Thames Act ?—Yes ; I have the honour to be City Solicitor, and therefore I am acquainted with the Conservancy Board.

5313. Do you think that the conservancy of the Thames could be put upon a broader footing ?—I think it is most desirable that the Board of Conservators of the Thames should be what they are in name —that is, conservators of the whole river Thames from Cricklade to the sea ; the river should be under one management, and above all things, the body should not be too numerous. I think it is essential for an administrative body that their number should not be large.

5314. Is not the principle recognized in this country that if you grant power to levy rates there should also be some form of representation ?—I hear such a principle as that enunciated, and it is said that they should go together, but it is not of universal application in this country. I can mention at once a case. The county rates are levied by the magistrates, who are not representatives in any sense of the word ; they are not elected by the ratepayers, I think it is desirable, and not only desirable but proper, that if the Board of Conservators have the control of the whole course of the river there should be some representatives from the upper districts placed upon that board.

5315. Referring to such towns as Oxford, Reading, Windsor, and other towns up to Banbury, they are all growing in importance, and having sanitary measures carried out in them, and will be likely to contaminate the Thames more than they have heretofore done : if therefore you are to improve the Thames through its whole course you will have to deal with the towns above Kingston as well as below ?—Yes.

5316. Do you know how the Thames Commissioners are at present constituted ?—I know that they are a very numerous body. I believe that every owner of land within certain limits is a Commissioner ; the magistrates and aldermen are all, *ex officio*, Commissioners in the upper district of the Thames.

5317. Have you had any experience in the working of large bodies of that kind ?—Yes ; I have an experience in my official position that a large body cannot ever be an administrative body.

5318. What I mean is that it is difficult to get together a large body for ordinary current business ? —Not only so, but it is totally unsuited to exercise administrative functions, because you cannot secure the attention of a large body of persons to details. Men will discuss and deal with principles, but when you want an executive body you must have a small number, or you may have a debate upon the most insignificant subjects.

5319. (*Mr. Harrison.*) You want a small number who will make themselves thoroughly acquainted with the subject ?—Exactly.

5320. (*Chairman.*) They must also have power by some means to obtain money and to expend it ?—Yes, without the sinews of war war cannot be carried on.

5321. It has been suggested that the river Thames is so exceptional that government might be called upon to find money in the shape of a bonus or gift to put it in order ; do you entertain any such idea ?—No. I do not think that the principle of applying to government is a panacea. It is a very easy mode of getting rid of difficulties, but it has never occurred to me that Government ought to be charged with the expense of maintaining the river Thames.

5322. You know, I presume, that there is a bonded debt now upon the Thames ?—Yes, that is all provided for as to the lower portion of the Thames. As to the debt on the upper part of the Thames I am not able to speak.

5323. (*Mr. Harrison.*) Was there a debt upon the lower part of the Thames when it came into the hands of the Conservators ?—Yes.

5324. How was that treated ?—It was transferred by the Conservancy Act in 1857 to the Conservators. There was some doubt whether the words were sufficient to impose upon them the obligation of paying it, and an action was brought against the Corporation by the bondholders, but they successfully resisted it. Since then, by the Conservancy Amendment Act, the debt has been transferred to the Conservators.

5325. How have they dealt with the debt ?—They pay interest upon it from time to time, and I suppose they will reduce the principal as their funds get in excess of their expenditure.

5326. (*Professor Way.*) They have taken the debt upon themselves ?—Yes ; Parliament has imposed it upon them. They never resisted it.

5327. (*Mr. Harrison.*) Was it a part of the whole debt to which the Commissioners were liable before the Conservators took it upon themselves ?—It was a debt that the corporation of London had created in order to raise funds to improve the navigation of the river while it was under their control. The river had been under the control of the corporation of London from time immemorial until it was transferred.

5328. How was the transfer made ?—There was a formal transfer of the soil of the river by the Crown to the corporation of London, to put an end to the question as to the right. The Crown conveyed the soil to the corporation, and then a Conservancy Bill was brought in to transfer the ownership from the corporation of London to the Conservators, and since then their numbers have been enlarged by admitting representatives from the shipping interest.

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5329. (*Chairman.*) I suppose you have considered the several interests which are involved in the Thames. First, there are the riparian proprietors, then there are the owners of weirs, locks, and mills, and there are also the owners of fisheries ?—Yes ; but I do not know much about the latter. We have no such owners in this immediate part of the river. I think on this side of Staines there are none. The Conservators, as they are at present constituted, represent only the interests concerned in the trading navigation of the river below bridge, and that interest is quite distinct from keeping up the river, and the weirs above for pleasure purposes, and also for purposes of up-country trade. I think certainly that those who are interested in that matter ought, to some extent, to be represented at any new Conservancy board.

5330. Any board that might be created to have jurisdiction over the entire course of the Thames would necessarily, I suppose, have to take into consideration riparian encroachments ?—The Conservators do that now within their area.

5331. That is to say, within their own area no person could encroach by building a river wall, or putting up a pier or jetty, or by filling in material likely to be injurious to the river ?—No person can encroach at all upon the river without the consent of the Conservators, without their licence.

5332. I suppose that if you were digging foundations, or making any alterations, you would be stopped by the Conservators ?—If I did it upon my own property it would not be an encroachment.

5333. But if you tipped waste material into the river, would the Conservators stop you ?—I hope they would ; there is a watch set along the river, and they would be sure to detect it. On one occasion I put out a very small covering for my boat, and they at once asked me to pay a rental for it. I know that they (the Conservators) are very vigilant.

5334. (*Professor Way.*) They exercise their powers vigilantly ?—They do.

5335. (*Chairman.*) Is your property freehold ?—Part of it is.

5336. If you are a riparian owner, where does your frontage stop, at high-water mark or low-water mark ; or does it extend to the centre of the river ?—The soil of the river belongs at this part to the Conservators.

5337. But that would not be so in the upper parts of the river ?—No. From Staines downwards the soil of the river is, by grant of the Crown and Act of Parliament, vested in the Conservators. My ownership stops on the shore, but the precise line is difficult to define ; but mine is embanked land, and there would be no difficulty, as the embankment would be the limit.

5338. Would it be possible, in passing the Upper Thames into the hands of the Conservators, to vest the soil of the river in the Conservators, in the same way as below ?—I see no objection to it.

5339. Would it not be an absolute alienation of that which is claimed as private property ?—I have no information as to the ownership of the soil of the bed of the river above. I always understood that there were no rights of foreshore in the river ; that it was an open course all the way through in its navigable part. The state of the ownership of the soil in the lower part was this—that the corporation of London claimed to be the owners of it in consequence of a grant from King Richard the First, I think ; the Crown disputed that, and contended that the ownership of all the bed or soil of the navigable part of the river was vested in the Crown. The question was never brought to an issue, as the Crown ended it by granting the soil to the corporation. Then the Act of Parliament to which I have referred transferred it to the Conservators. If the Crown is seised of the soil above Staines there is no objection, as it appears to me, to Her Majesty doing the same as in the lower part of the river, namely, granting the soil of the waterway to the Conservators ; they now claim only their title as derived from the Crown.

5340. In the upper Thames and on the tributaries I think you will find that the river, in many instances, serves as a boundary between counties, parishes, townships and estates, as also that custom has defined the centre of the river for the time being as the divisional line ?—So it is in the lower Thames, but it does not transfer the ownership of the soil to a parish. The parish of Hampton Wick has its boundary separated from Ditton and Kingston by a line drawn down the centre of the river, but that does not interfere with the ownership of the soil of the river being vested in the Conservancy Board.

5341. (*Professor Way.*) At Windsor I think it was stated that the corporation claimed the bed of the river for dredging purposes ?—That may be, but I have a general impression that the ownership of the soil of all navigable rivers, except where special grants have been made, is in the Crown.

5342. (*Chairman.*) Do riparian proprietors claim not only the bed and soil of the river, and the right of using the water, but also the right to abuse it to any extent ?—That is guarded by the common law. Every riparian proprietor has a right to take the water of the river for all reasonable purposes, that is to say, for the necessary irrigation of his land and the drink of his cattle, but he has no business to interfere with the supply of water to the damage of those below him.

5343. Nor would he have a right to pass ashes or other refuse into a river ?—No right to commit a nuisance can exist in this country, as it is contrary to our very first notions of law, according to which a nuisance is indictable.

5344. Still if the practice has grown up, and you find all the parties upon the banks of a river abusing the stream, they are all in the same boat, and there is no one to take proceedings against them on behalf of the public ?—That is, not that they have a right to do so, but that those who ought to have protected the river have not done their duty, and if you succeeded against one offender that would probably stop the others. I do not think that the riparian proprietors on the upper Thames have a right to foul the river to the injury of the riparian proprietors below them.

5345. Nor to embank it ?—I think that all embankments and alterations of the river ought to be done under the control of a board who might see that they were carried out in the common interest of every owner.

5346. If land is liable to be flooded, the owners have no right, you would say, to shut such flood waters out by embankments at the expense of their neighbours ?—I think, repeating my former answer, that whatever is done ought to be done in the common interest of all, and not in the interest of a particular individual.

5347. That can only be done by having one board to act legally for the whole ?—I entertain no doubt upon the subject, that one governing body for the Thames in its entire length is in the highest degree desirable.

5348. (*Mr. Harrison.*) Is there any reservation of the soil of the river to the Crown in the Act transferring it to the Thames Conservators ?—No; it is absolutely vested in the Conservators ; they are the owners in fee of the soil of the river, and they are created a corporation for the purpose. The Commissioners have probably made inquiries in other districts about the jurisdiction of the Conservators, where, as I understand, the locks and weirs are in a very bad state.

5349. Have you been in the habit of going up the river ?—Yes, as far as Windsor. I have some knowledge of the river for a considerable distance, about Henley.

5350. Do you think that to put the river into a proper condition, so as to be really serviceable, will require considerable alteration and improvement ?—I have scarcely looked at it to see what was necessary to be done, and my evidence upon that is not of any value.

5351. In Mr. Leach's report to the Conservators he

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says :—" This idea leads me to point out a want that " exists of a proper map of the part of the river under consideration, cross sections, &c., which would give " information that is much needed in dealing with the " question ;" without this he would not be able to see what was required to be done upon the Thames or to form an estimate of the expense of doing it. Does it not seem desirable that such a plan and section of the Thames and estimates of the cost of putting it into a really useful condition should be prepared before steps are taken to hand it over to any new body ?—A survey of the Thames, if none such exists, is absolutely necessary before you can remedy any of the evils. To construct any engineering works, or to remove any of the existing locks, without having had a proper survey made, would be leaping in the dark. I should be surprised to hear that no survey of the Thames does exist ; but I do know that what maps are published are very imprfeect, for locks are put down upon them that do not exist, and where there are locks you do not find any.

5352. (*Professor Way.*) May I ask whether, in your capacity of City Solicitor, you are aware that the question of the future government of the Thames has been brought before the city authorities ?—Not at all. The corporation are only connected with the conservancy of the river in this way, that the Lord Mayor is an *ex-officio* member of the Conservancy Board and chairman of the Conservancy. I believe that either five or six members of the corporation—two aldermen and four common councillors—are elected to represent the corporation at the Conservancy Board.

5353. And there has been no official intimation of their opinion on the subject ?—Not the least.

5354. (*Chairman.*) Are any of those members paid ?—I think that in the Conservancy Amendment Act that was passed either last session or the session before, there was a clause, that out of their revenues a certain sum should be distributed among the board as the board might direct. Before that they all discharged their duties gratuitously.

5355. (*Mr. Harrison.*) If there were representatives for the upper districts of the Thames do you think they should be paid for their attendance upon the board ?—Yes. The same as the board of directors in joint-stock companies are.

5356. You would pay them a guinea, or whatever the sum might be, and their expenses to town and back ?—The expenses to town and back is another matter.

5357. (*Chairman.*) Do you think that men very soon tire of doing public work for nothing ?—No. But if a man has two appointments to keep at the same time, and for one he is to be paid, and for the other not, it is an infirmity of human nature, I think, to go to the one that produces the guinea.

5358. (*Mr. Harrison.*) Have you considered what degree of representation should be given to the towns in the upper parts of the Thames ?—No; of course the riparian proprietors must be considered, but it is difficult to devise a scheme for representation. My view is that it should be limited in number.

5359. (*Chairman.*) By whom are the members who are drafted from the corporation elected ?—By the common council.

5360. Still they are elected into the corporation by the general body ?—The common council is dissolved and re-elected every year, on St. Thomas's day, and therefore they are elected by the freemen and ratepayers, but the aldermen are elected for life.

5361. Do you think that the Thames Commissioners, as constituted by Acts of Parliament, could be divested of their executive power, and be left with an elective power only—to elect the parties to represent the upper portion of the Thames at the Conservancy Board ?—I have not thought how the representation should be constituted, not expecting that my opinion would be considered of any value upon the subject.

5362. The present number of the commissioners is between 600 and 700, and they comprise gentlemen who own land to the value of 100*l.* a year in the counties through which the river passes, or they are persons possessing personal estates of the value of 3,000*l.*, residing in those counties, or they are bondholders to the extent of 500*l.* There are also *ex-officio* members, the representatives in Parliament for the counties of Wilts, Gloucester, Berks and Bucks, and for all the cities and boroughs within those counties, and for the university of Oxford. Also the representatives in Parliament for the counties of Middlesex and Surrey, and for the cities of London and Westminster, and the borough of Southwark, the Lord Mayor and Aldermen of the city of London, the Vice-Chancellor, and heads of colleges and halls in the University of Oxford, the dean and canons of Christ Church the dean and canons of Windsor, the provost and fellows of Eton College, the rector and incumbents of the several parishes that border upon the Thames and Isis on both sides, from Staines to Cricklade, the mayor and recorder of Oxford—Abingdon, Wallingford, Reading, Henley, Maidenhead and Windsor. The senior bridge warden of Great Marlow, and the clerk of Her Majesty's board of works, residing at Windsor Castle for the time being. Then the river is practically managed by a committee of 15 Commissioners, chosen from five districts, into which the navigation is divided, three from each ; but the proceedings of that committee are controlled by general meetings of the Commissioners ?—I think that the ingenuity of man could not possibly have devised a board less likely to discharge its duties in an efficient manner than one so constituted. I believe that the greater part of the persons enumerated have no real interest whatever in the river ; and the only persons there who ought to be preserved as an elective constituency would be the owners of land, the riparian owners of 100*l.* a-year. What the owners of personal estates can have to do with the river I cannot see.

5363. The colleges at Oxford own large estates upon the Thames ?—Then they would have votes as riparian proprietors.

5364. The colleges are very largely interested in every way ?—No doubt Oxford has an interest second to none except the metropolis.

5365. You do not think that you could take away from this numerous body all controlling power, leaving them, as now, the power of electing 15 Commissioners, or any smaller number ?—I think, if there is a constituency ready to hand to elect 15 Commissioners, it might save trouble to adopt that as it is, but I should have thought that a much easier scheme would have been to have taken the riparian owners owning land to the value of 100*l.* per annum, and the mayors of the various towns upon the banks of the river.

5366. I think you must include the dean and canons ?—I might give Oxford some more representatives, the vice-chancellor might be elected as well as the mayor of Oxford.

5367. Then the Crown is largely interested in Windsor ?—Yes, and of course some representative of the Crown should be at the board, but the Crown at the present time nominates *ex-officio* members of the Conservancy Board.

5368. Would the country like to have Commissioners nominated by the Crown, or by a body not having a pocket interest in the district ?—I assent to that, and I think it might be tried by way of experiment, that the present Commissioners should be turned into an elective body to elect 10 or 15 Commissioners for the upper district, and if that did not work, it could easily be amended.

5369. Are you aware that the committees are at present absolutely paralysed by an opinion which has been given by counsel ; for example, supposing a lock required repair, or any other improvement became necessary, and a committee thought fit to direct any repairs to be done, the Commissioners have been advised that if there is not money in hand to meet the payment, they, the committee ordering the work, would be personally liable for the expenditure they had ordered, however urgent such work may be ?—I was not aware of that.

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5370. Do you think that is a condition in which the river Thames, its ruinous locks and weirs, and its Commissioners, ought to be left for any length of time ?—Certainly not ; but on the other hand you have no right to ask a tradesman to undertake work unless there is a competent paymaster.

5371. There appears to be no income derived from the upper Thames sufficient to meet the cost of necessary works for maintenance, and the committees have been advised that if they have not money in hand they will be held personally liable for any expenditure they may incur ?—Then I think there is the more reason why the jurisdiction should be transferred, as soon as possible, to a body that has funds.

5372. And the means of raising money ?—Yes, I think they should have the most plenary powers as to dealing with locks and weirs, subject of course to such vested interests as there might be in mills and so forth.

5373. (*Mr. Harrison.*) Are the funds of the Conservators in any respect different from those which the Commissioners had, viz., a revenue from lock dues ?—I have not the Conservancy Acts with me now, but I believe they have a considerable income. They derive an income from rights granted to make encroachments, such as to put in jetties and wharves which bring in a rental. I think, if it is not heresy to say so here, that a small toll might very fairly be imposed upon pleasure boats that go through the lock at Teddington, which is now entirely free, there is always a good number there on Saturday afternoon. There are some hundred boats which come through that lock, and most of the owners, I daresay, now give a gratuity to the lock-keeper. I always do ; and I think all pleasure boats might pay a small toll ; they require the man to fill the lock and to empty it, and I am sure that, in this neighbourhood, such toll would produce a considerable annual income.

5374. (*Chairman.*) To be applied to the improvement of the river ?—Clearly so, to go into the general funds of the Conservators. The river Thames is a source of great gratification and pleasure, and all those who go upon it and can afford to pay for the hire of a boat ought not to begrudge paying a trifle for going through a lock.

5375. (*Mr. Harrison.*) That might become a source of much greater income in future ?—I think so.

5376. Sixpence a boat is paid higher up the river ?—Yes, and Teddington lock at present is perfectly free.

5377. Do they not pay 6*d.* below Staines ?—No ; although Teddington lock is entirely free as regards the Conservators, I never go through without giving the man something ; I am not bound to give anything A regular toll would bring in a certain income. The river, in my opinion, will be kept up principally for pleasure purposes. No large amount of trade will come back to the river above Staines, as the railways save time and cost. In this neighbourhood, in the coal traffic, the river successfully competes with the railway, but the distance is not far for the horses to draw a barge. In the upper parts of the river it is not so.

5378. At Windsor, apparently, the railway has the run of the traffic, but at Reading they think they could compete with the railways by water. At Oxford the canals are said to compete successfully with the railways ?—Yes, they are connected with the manufacturing districts. What I mean is, that whatever commerce may be brought into the pool or into the docks in vessels to go up as far as Hampton, water carriage will compete with the railways, but when you get a greater distance up the river, the expense of haulage is very great, and the point then commences where the railway successfully competes with the river.

5379. If steam was introduced, how do you think that would affect the question ?—I see constantly one steam barge which comes from Reading, she is called the "Experiment," and she goes up and down the river constantly ; she is propelled upon the American system, with the paddles behind which do not seem to injure the river at all; but a steamer, either a screw or a paddle, going through the water at a high rate of speed, would I fear wash the banks away very much.

5380. The present commissioners on the upper Thames have come to a sort of standstill, in consequence of not having any revenue except the tolls to fall back upon, and it would evidently not be desirable to pass the upper Thames into the hands of any other body without there being sufficient security that it should be kept in proper condition ?—If it were passed into the hands of the Conservancy Board under the same conditions as the lower part of the river, the object would be accomplished.

5381. Would there be sufficient security that in their hands the upper part of the Thames would be kept in constant good order by the Conservancy Board ?—If the upper Thames had representatives I should say so; otherwise the natural tendency of the Conservancy Board, as now constituted, would be to care for the would spend the funds there because the funds would be always derived principally from the lower district ; I think that the upper part of the district must be represented, and one reason would be, that the lower part would be more immediately under the notice of the Conservancy Board which sits in the metropolis.

5382. Does not that appear to point out the absolute necessity of having a complete scheme prepared as to what is to be done upon the Thames before the whole of the management is passed into the hands of anybody ?—I hardly think that that is necessary. If the commissioners would be guided by the advice of their engineer and surveyor when they are constituted, that advice could be as well given after the powers were transferred to them as before.

5383. Do you think that they should have power to do what they deemed necessary, or to put the whole of the river into good order ?—If you asked them to put the whole of the river into good order, they would have to raise money for the purpose, before they exactly knew what the income might be, and I am afraid that that would necessitate calling upon the Government to find the funds if you asked them immediately to proceed and to prepare some plan.

5384. Do you think the river is at all likely to recover any portion of its trade unless it is put into good order ?—No. I think the restoration is a thing that must be done by steps, and not to be taken in hand like a railway, to be made all through in 18 months.

5385. (*Chairman.*) Mr. James Simpson, engineer to some of the water companies, has stated that the maintenance of the navigation is a benefit to all the water companies of London, to the water supply of Windsor Castle, to many mills and manufactories, as also to landowners and others. Is there any rate laid upon the water companies ?—I am afraid that they take the water from the river gratis, I understand so; I have no definite knowledge of what the arrangement between the water companies and the Conservators may be; but there is nothing upon the face of the Act of Parliament imposing upon them any rental for the use of the water of the river.

5386. (*Mr. Harrison.*) Were the improvements between Staines and Teddington carried out by the Thames Conservancy ?—They were all carried out by the Corporation of London, except what has been done this last summer at Surbiton promenade.

5387. When the corporation took to that part of the river, did they take to any debt with it ?—No, the corporation had had it from time immemorial.

5388. But there was a time when they had it not; when it belonged to the Thames Commissioners?—Not the lower part of the river.

5389. To Teddington I think ?—I think not. They have had it from Staines to Yantlet Creek from time immemorial. I think the conservancy of the Thames was expressly granted to the Mayor of London by charter in the fourth year of the reign of King James 1st.

5390. When the conservancy took to the river, I find that the debt was handed over entirely to the Conservancy Board ?—Yes, I stated that before.

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5391. With regard to the question of the soil of the river, there is a clause in the Act of 1857 to this effect: "Provided always, that the portion of the bed " or soil, or shores of the river Thames, or any encroachment, embankment, or inclosure therefrom or " thereupon, in front of or immediately adjacent to " any lands, buildings, or hereditaments, whereof or " whereto Her Majesty, or any person or body in " trust for her, was or were on the 18th day of " December 1856 seised or entitled in possession, " reversion, or remainder, or which on the said 18th " day of December 1856 was the property of any " part of Her Majesty's Government, or in the possession of any such department, or any officers of " the same, shall not be vested in the Conservators, " but shall continue vested in or in trust for Her " Majesty, or in or in trust for such department or " officers, and be subject to the exercise therein of " the same powers, authorities, rights and privileges " as if this Act had not been passed." That does not quite agree as to the whole of the soil of the bed of the river being vested in the Conservators?—I thought it did, and that that merely applies to the ownership of the soil of any lands upon the banks; not the soil of the bed of the river.

5392. The words are, "That the portion of the bed " or soil, or shores of the river Thames, or any encroachment, embankment, or inclosure, therefrom " or thereupon in front of, or immediately adjacent " to any lands"?—I cannot tell what the object of that reservation was, but if you have the Act of Parliament, you will find that there is a recital of a deed of conveyance from the Crown to the corporation of the soil of the bed of the river.

5393. Would not this override that?—I cannot tell what that was intended to apply to. Parliamentary draughtsmen very often put in precautionary clauses, that something that belongs to somebody shall not be taken away by the Act; there is an agreement recited in the Act.

5394. I find these words in the "Articles of Agreement:" "Thirdly, the said grant and conveyance " shall not comprise the shores or bed of the said " river"?—If the soil of the river did belong to the Crown in front of the land, then it would still belong to the Crown, but the Act does not give it to the Crown; it leaves it still in dispute; there is an instance of that close by. The soil at the side of the river from Hampton Court Bridge to Kingston Bridge is the property of the Crown—the Home Park—and the Crown would say, "the bed of the river belongs to us."

5395. (*Professor Way.*) Suppose you had an estate on the river, could the soil or bed of the river possibly be the property of the Crown, while you had a right to the land and to the banks on both sides?—The Crown contended in a suit, and I believe still does contend, that the ownership of the bed, soil, and minerals beneath, of all navigable rivers is vested in the Crown.

5396. (*Chairman.*) Suppose, for example, that valuable minerals were hereafter to be discovered under the bed of the river?—If the Conservators were the owners of the soil they would have the minerals also.

5397. The foreshore of part of the river below London is in the Crown, as is specified in certain Acts of Parliament, below Sheerness, and on the Essex coast the foreshore at Shoeburyness?—I do not know how that may be, but I think that that is beyond the jurisdiction of the Conservators. I believe the Crown claims the sea shore down to low-water mark.

5398. Do you think that any clause or any set of clauses could be framed to define the boundary line of the river, where the river is notoriously liable to shift in its bed. At the present time, in the upper reaches of the Thames, and in many of the streams and tributaries, the bed of the river is constantly shifting, and there is no authority to determine where the boundary is. It was originally said to be the centre of the river, but the centre of the river becomes altered by the shifting of the river in its course?—That could be got over by a special commission being appointed to set out the boundaries of the river as between the riparian proprietors and the Conservators.

5399. And to amend the boundaries from time to time?—No, the boundaries having been once set out you would leave it to the Conservators to take care of the future course of the river and to settle everything as to boundaries.

5400. This case might arise, that the river within no very remote period might have so shifted its course as to have gone more than its breadth out of its former line, and then the riparian proprietor on one side, if the boundary remained fixed as it was before the river shifted, would have lost his frontage altogether?—Yes, but I think that question might safely be left to a public board to deal with.

5401. At the present time there is no recognized method of dealing with it?—No. If what is the Thames and what is not the Thames is doubtful, I think two or three Commissioners should have plenary authority to set out the boundaries before it passes into the hands of the Conservators, and then, that having been once done, it might safely be left to them to regulate it for all time to come.

5402. The river frontage is, of course, of very great consequence to riparian proprietors?—No doubt of it.

5403. And it would be monstrous if any neglect of the river or any act of nature deprived a riparian proprietor of his frontage, so that it could be said he was for ever deprived of the frontage which belonged to his estate in former times?—I assent to that, with this qualification as to an act of nature. I do not think that would be a hardship, because a man takes his chance of that.

5404. (*Mr. Harrison.*) Let me draw your attention to the question of the jurisdiction of the Commissioners. The first Act, the 24th of George II., was "An Act " for the better carrying on and regulating the navigation of the river Thames and Isis from the city of " London, westward, to the town of Cricklade in the " county of Wilts." Then the 11th of George III. was, "An Act for improving and completing the navigation of the river Thames and Isis from the city of " London to the town of Cricklade in the county of " Wilts." Then the 15th of George III. was, "An Act " to amend An Act made in the 11th year of His " present Majesty's reign for improving and completing the navigation of the river Thames and Isis " from the city of London to the town of Cricklade " in the county of Wilts." Then the 28th of George III. was, "An Act to explain, amend, and " enlarge the powers of so much of two Acts passed " in the 11th and 15th years of the reign of His " present Majesty for improving and completing the " navigation of the river Thames and Isis from the " city of London to the town of Cricklade in the " county of Wilts, as relates to the navigation of the " said river from the boundary of the jurisdiction of " the city of London, near Staines in the county of " Middlesex, to the said town of Cricklade"?—I still say that the corporation claim a jurisdiction over the river Thames from Staines to Yantlet Creek by prescription, and that there is an express charter which I could produce, if any question turns upon it, from James I., granting the office of Conservators of the river Thames to the Mayor and city of London, from Staines to Yantlet.

5405. The probability, I suppose, is that there was nothing done, as there was apparently a double authority for a time between Staines and the city of London?—That I do not know.

5406. (*Chairman.*) Is there anything further that you desire to mention to the Commissioners?—No, except that I would suggest to you the propriety of inspecting the outfall of the Kingston sewage before you leave the neighbourhood. The whole of the shore is covered with a sort of black slimy deposit that comes out of the sewer, fouls the shore, and at times causes a bad stench.

The witness withdrew.

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JAMES SIMPSON, Esq., Civil Engineer (of Surbiton), examined).

5407. (*Chairman.*) You are engineer to one or two of the metropolitan water companies?—I am engineer to the Chelsea and Lambeth water companies.

5408. You have been connected with them for a long time?—I have been connected with them for many years.

5409. You are, I think, consulting engineer to the Crown for the supply of water to Windsor Castle?—I am employed by the Crown for that purpose.

5410. How long have you known the Thames?—All my life; intimately I may say for 50 years; with little intermission, I have lived upon it here and elsewhere all my life.

5411. How many metropolitan companies take water from the Thames immediately above Kingston?—Five.

5412. What are their names?—The West Middlesex, the Grand Junction, the Southwark and Vauxhall, the Lambeth, and the Chelsea.

5413. Within what area of the river do they all pump, within a mile or so of each other?—No; I should think that the three first I named must be two miles and a half above the two last.

5414. Do they all pump from the reach above Teddington lock?—No; the Chelsea and Lambeth Companies pump from that reach, and the others from Moulsey reach.

5415. Above the next lock?—Yes.

5416. Do they know what volume of water is at present taken from the Thames?—I do not know of my own knowledge as to the other companies, but last summer the Chelsea and Lambeth companies took about 22,000,000 of gallons a day.

5417. Do you think that anything like 100,000,000 gallons per diem were pumped out?—Certainly not. The existing engine power and pumps could not do it. I do not believe the daily volume has ever exceeded 60,000,000. The engineers will tell you exactly, for the quantities were very particularly taken.

5418. I see it has been stated that "the maintenance of the navigation is a benefit to all the water companies of London and to the water supply of Windsor Castle." Do you think it is necessary to keep up the weirs of the upper Thames on account of the water supply?—I think it is a most material thing, and there is no doubt that they do very greatly regulate the supply of water. We are in a different state from what we were in some years ago. Land drainage has been introduced very extensively, and we have shoots of water into the Thames much more rapid than they used to be, and we have also lower water at times. I may mention to the Commissioners, if it would be of any assistance to them, that I could give them a record of the water in this reach for some years past; it has been taken every morning at 9 o'clock. There is a popular notion as to the river water being extra low, but that is when they draw the weir down at Teddington.

5419. They have power to do that?—Yes, they can take the flash boards from the weir, and let it down.

5420. Do the companies with which you are connected ballast the Thames opposite their works?—We took gravel and sand out merely for the purpose of the works during their construction, not for any other purpose. We have a very fine reach for ballast.

5421. Do you obtain your filtering sand by ballasting?—Yes, from the upper part of the Thames, principally above Moulsey.

5422. Do you find greater difficulty with the weeds than you did formerly?—There is a little more difficulty, but I cannot say that my observation has led me to consider weeds a serious difficulty. We have occasionally seen the American weed in the Thames Weeds accumulate more in some parts of the river than in others.

5423. Is the river in a different state as to its purity since sanitary works, main sewerage, and house drainage have been carried out in Windsor, Eton, and other places?—I have not observed that. The volume of sewage is not large. I think it is very difficult to state that the river water has been at all affected.

5424. What distance is it from your works to Windsor by the river?—I think it is upwards of 20 miles; between 20 and 30 miles.

5425. Something has been said about an arrangement with the Thames Conservancy Board as to payment for taking the water or for establishing pumping works on the river; will you be good enough to state what it has been?—So far as the two companies I am connected with are concerned and the Conservators, there was an agreement upon the first taking of the water. It was not mentioned in the Act of Parliament, but a deed was passed between the Lambeth Company and the Conservators by which the company were to pay 1,000*l.* premium and 200*l.* a year. The Chelsea Company pay 300*l.* a year under a similar agreement.

5426. The Chelsea Companies paid no premium then?—No.

5427. Do the other water company pay anything for taking water from the Thames?—I am sure they do. I do not know the terms, but I believe they are all something similar to those I have named.

5428. Do you know anything of the river Lea?—Yes.

5429. (*Mr. Harrison.*) Was that payment made by the water companies to the Conservancy as a compensation for the water they took, or do you consider it was, as stated by Mr. Leach, to repay the interest of the money that the Conservancy had to expend in putting the reach into proper condition for the navigation consequent upon the withdrawal of water by the water companies?—It was to make good any expenses the conservators would incur in consequence of the water companies taking water. It was not in my opinion absolutely for the water.

5430. Do the Conservators now use the open weir at Teddington for the purpose of sending flashes down the lower part of the river?—No, I am not aware that they do. A flash would not be necessary in the tideway, but the weir is used for regulating the water.

5431. Not for sending flashes down?—I am not aware that it is. Teddington weir is a very fine weir.

5432. You said that you would kindly furnish us with the gaugings of the water, the height to which it has risen day by day?—Yes, it has been taken about 9 o'clock every morning.

5433. Have you ascertained also the velocity of the stream at the same point?—No, we have not.

5434. Have you any cross section of the river there?—We have not at that point, but immediately above it. I have an elaborate set of experiments with cross sections; the experiments were a set by themselves, and then the velocities and all were taken.

5435. (*Chairman.*) Do you remember what number of houses your companies supply?—I do not remember exactly, but I should think about 28,000 are supplied by the Lambeth Company and about 25,000 by the Chelsea Company.

5436. Has the increase been large within the last 20 years?—Yes, very large.

5437. Is that increase still going on?—Yes.

5438. Knowing the Thames so intimately, do you anticipate any difficulty from the increase of the metropolis in obtaining the necessary volume to supply it with water?—Not at present, but looking forward I think we must anticipate that more water will be required. Considering the improved habits of the people we cannot expect them to use less water.

5439. What quantity per head do you now supply?—Somewhere about 30 gallons.

5440. To the population that you have in your rent roll?—Yes, but there is also a great deal of water taken for manufacturing purposes.

5441. Is there any portion of the Thames valley

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where you could impound water, and so increase the storage in the event of a much greater supply being demanded for London?—There are several places beyond Reading, or higher than that, beyond Oxford, where I think it would be most desirable on account of the Thames itself to construct impounding reservoirs, if it was done on a proper scale. It is a splendid river, and the water is most beautiful up there; and if we could arrest the crest of the floods and let such impounded water down in short-water seasons, it would be a very great gift for this river. In very extreme floods we have the water rising here as much as 11 feet 10 inches above summer level, we very often have it from 4 feet to 6 feet above summer level.

5442. (*Mr. Harrison.*) Have you ever calculated the quantity of water that passes down in the heaviest floods which occur on the Thames?—No, but it is very large.

5443. (*Chairman.*) A rise of 11 feet 10 inches would give you, with increased velocity, an enormously increased volume of water?—I think more than 50 times, probably as much as 70 times the dry weather volume.

5444. With a rise of 11 feet 10, large areas of agricultural land would be laid under flood?—Yes, immense areas, and it then does a great deal of injury to the upper country. In 1852 Kingston was under water some time, but these extreme floods are not frequent; other floods we have pretty nearly every year.

5445. Floods of this exceptional character come at long intervals, but still nothing has taken place which would lead you to imagine that they might not occur again?—No, certainly not; I am inclined to believe with Howard, who wrote upon the climate of London, that we pass through a cycle of the seasons in, he said, 16 years, probably in less.

5446. And then these excesses recur over again?—Yes.

5447. (*Mr. Harrison.*) Would it be possible to impound the water up the different tributaries of the Thames and upon the Thames to such an extent as to prevent excessive flooding in the lower part of the river?—Yes, a very large portion of it. I think we could take off three or four feet of it.

5448. You had some interesting observations made on the river Churn some years ago?—I had.

5449. On the occasion of their losing the water from the Seven springs?—Yes.

5450. And upon other tributaries of the Thames as well?—Yes, in the case of the Churn a set of very nice observations was made, and they were followed out very particularly.

5451. Are they given in detail in the "Transactions of the Institution"?—I do not know that they are in detail, but they were presented to the society, they are an elaborate set of experiments.

5452. And besides that you added an elaborate statement I think?—Yes; it is entirely at your service if you wish for it.

5453. I believe you made some observations upon the Cherwell as well?—Yes.

5454. (*Chairman.*) Is there any limit put upon the water companies as to the volume of water they shall take out per day?—The Lambeth and Chelsea companies are limited to 20,000,000 to each company.

5455. That is 40,000,000 between them?—Yes.

5456. To what quantity are the other companies limited?—I do not know.

5457. It is constantly asserted that the abstraction of the water amounts to 100,000,000 of gallons per day?—It cannot be so; that is more likely to be their limit, and not what they take.

5458. Do you think that 100,000,000 of gallons per day might be taken from the Thames without injury to any interests?—Yes. Mr. Bateman has recently put it forward that the least quantity per day at Sunbury was 380,000,000. We have no gauge down here quite so low as that; but if you took 100,000,000 off that it would be regulated by the weir at Teddington.

5459. In the event of a Conservancy Board being appointed to put the Upper Thames in order, and to compel all the towns and villages either to disinfect their sewage, or to keep it out of the river, do you think that claim might be made upon the companies for an increased payment for the improved privilege they would enjoy?—I have of course no authority for saying so, but if it was a reasonable sum I should say yes; if it was an unreasonable one I should resist it.

5460. If Parliament at the same time gave you the privilege of charging it in your rental upon the consumers, would you then object?—That would be another question. In this country things must be mutually beneficial; we must go together.

5461. I suppose you are of opinion as an engineer that a continuation of the existing condition of things, that is to say, the navigation bankrupt, the locks and weirs rotting to decay and likely every week to become worse, and liable even to be destroyed in a flood, would not be beneficial to the water companies you represent?—Decidedly not. If the river is allowed to go back into its normal state I apprehend there would be all kinds of difficulties, for many of the reaches would be so grown up with weeds in the spring and summer that the channels would be forced in other directions and the greatest mischief would occur.

5462. As an engineer of very great experience, do you believe that it is the duty of the Government to constitute some body to exercise absolute power over the maintenance and regulation of the river through all its branches?—Yes, a body sufficiently numerous, but not too numerous, to accomplish it; but I should certainly have a very great objection to separating the management from the landowners and others who are interested above. I think that we really must not transfer it all to the city, or we shall be as bad at that end as at the other.

5463. You would not like to hand the conservancy of the whole river over to a Government board as is done in France?—No; we want it left or placed in the hands of those who are interested in it. The mischief of the present commission is that there are so many persons who are really not interested, and they cannot be got together. I have been in the habit of meeting that board for some years, and I know that we formerly had very great difficulty; we generally met only the clerk at Maidenhead.

5464. Have the water companies you are connected with any elective power, or are they at all represented on the commission?—No, the two are entirely independent and the river has unfortunately got into a state out of which it can hardly be brought; in fact I have felt the difficulty so much, and have so much feared that there might be inconvenience at Windsor Castle, that I have recommended the Government to put into repair the Romney weir and lock and the contract is out now for that work.

5465. Government or the Board of Works is going to repair the lock and weir so as to maintain their own water supply?—Yes, it seems to be of no use going to people who are only indirectly interested. There is Tangier Mill at Eton College and there are the provost and fellows, and the dean and canons of Windsor, and you would suppose that they were interested; but what can they do? There is no money to be got from those parties.

5466. What do you estimate it will cost to put that lock and weir into order so as to make it secure for your purposes?—About 2,800*l.*

5467. And this work will be paid for by the Crown or by the Board of Works?—Yes,* with a probability of charging it hereafter if a new Conservancy Board is established with funds, but at the present time there is no such body to go to for funds. We have proceeded upon the invitation of the Commissioners; they issued a notice to parties some 12 months ago, intimating to them that they might do their own repairs at their own expense.

5468. (*Mr. Harrison.*) They offered that to the Crown did they?—They offered that to different per-

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* Since the delivery of this evidence the First Commissioner of H. M. Works has stopped the work of reparation.

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sons who were interested in the locks and weirs; it was a public circular.

5469. To the effect that parties might repair the pound locks if they chose?—Yes, and the weirs. Many persons interested in mills thought that it would be a very good thing to do, but I am not aware whether it was taken up by anyone. I thought it was a good opportunity and I recommended the Commissioners of Her Majesty's Works to act upon it.

5470. (*Chairman.*) Are they about to rebuild the lock and the weir, or merely to repair them?—Merely to repair them. It was a question whether we had a right to do anything else.

5471. (*Mr. Harrison.*) With respect to the navigation between that and the lock at Old Windsor, is there plenty of water at low-water time on the lower sill of Romney lock?—We shall throw it down a little and make it equal to Old Windsor lock.

5472. (*Chairman.*) Is the lock made of timber?—Yes.

5473. Shall you restore it with the same material?—Yes, with some small quantity of brickwork and concrete behind the sheeting.

5474. You do not propose to construct the lock entirely of masonry?—No; we have not funds for that.

5475. (*Mr. Harrison.*) You are well acquainted with it; there are three sets of gates?—Yes.

5476. What were they made for?—To pass long and short barges.

5477. (*Chairman.*) And in doing so to save water?—Yes, in short-water seasons.

5478. Do you think it is possible to make the navigation of the Thames again profitable?—I have a very strong opinion that with energy and perseverance it could be done.

5479. So as to be profitable?—I do think so, for there are some articles railway companies do not care to take, and I think that such articles would come on to the river again if encouraged; but in the state of uncertainty that the river navigation is now in, this cannot take place. The river Lea has regained a large portion of its trade by its improved condition, and the lower part of this navigation has retained a great portion of its trade. I have heard it exceeds 15,000*l.* a year.

5480. There has hitherto been no steam dredging in any of the pools on the upper Thames; do you think that steam dredging might be advantageously applied to deepen those pools?—Yes, steam dredging will be useful. There is a very large accumulation from the bridge on the upper side of the town of Kingston, certainly one-third across the Thames, and there was not more than 2 feet of water this day upon it; it has accumulated from time to time, and it commences just at the head of the town; whether it has been caused by parties throwing in refuse at the landing place, I do not know.

5481. I suppose you know that when you let a river get out of order one irregularity tends to bring on another?—Yes, and shoals accumulate very fast.

5482. (*Mr. Harrison.*) From your knowledge of the river do you think that many of the locks require to have that done which you intend to do at Windsor, namely, the lowering of their lower sill?—Yes, they all require regulating. If the funds would admit of it you could of course do better, by constructing brick locks with stone coping, but I am afraid the navigation must creep before it can go very fast.

5483. (*Chairman.*) For what number of years will your proposed repairs at Windsor stand?—For 20 years, with attention.

5484. Then I suppose, with an economical body of Commissioners, it might be a reasonable matter for calculation whether a renewal after 20 years would not be less expensive than constructing more costly but also more permanent works in the first instance?—Yes; but where you have a fixed trade, money at five per cent. doubles itself in 14 years.

5485. (*Mr. Harrison.*) Was the sum you mentioned as the expenditure necessary for the alteration of the lock and of the weir near Windsor?—For the whole work.

5486. (*Chairman.*) That money, I suppose, will be provided by a Government department?—By the Commissioners of Her Majesty's Public Works.

5487. Out of funds belonging to Windsor Castle?—It will be obtained through the Treasury.

5488. (*Mr. Harrison.*) Do you know the river a little below that weir at Windsor; there is a very sharp turn nearly opposite to the lock at Old Windsor, do you recollect the encroachment on the bank there?—Yes.

5489. It was stated this encroachment had been going on for 20 years?—I do not remember as to time, but I know it is a considerable encroachment.

5490. Do you know what it arises from?—No; I have only seen it in passing down the river.

5491. Do you think that the weir at Windsor has anything to do with it?—It may have washed much ballast down on that part, which has kept accumulating.

5492. Is not the tendency of weirs to disarrange the bottom of a river?—Yes, for a time; but if they are attended to and dredged out, we do not find them so difficult to deal with.

5493. If you put a weir in a river you disarrange the bed, and it becomes requisite to dredge in order to keep it in its normal condition?—Yes, it does.

5494. (*Chairman.*) I suppose the weirs as they exist have not much apron provided on the lower sides?—They have an apron to some extent, a wooden apron.

5495. Does that extend to some distance from the weir?—No, only about 20 feet; sheet piling is placed at the end and that forms an overflow, and if there is a hole washed out there it is of no great consequence.

5496. Would not an apron more extended tend to regulate the bottom flow in a more direct line than at present?—Yes it would, but that is a question of expense.

5497. (*Mr. Harrison.*) On the Severn Sir William Cubitt erected some locks and fixed weirs?—Yes.

5498. To follow out your view as to a collection of water in the upper reaches of the Thames to send down equally for the metropolitan water supply it would appear desirable not to have exactly a fixed head but means to alter the level of the reach above the weir as is done now?—You would provide means to lower the water, but I think it would be well to make impounding reservoirs independent of the river stream, and let the water out into the stream so as to increase the volume of the stream rather than allow any great variation in the flow of the river.

5499. You would have collecting and impounding reservoirs?—Yes, if you could obtain land reasonable in price. You can go to a very good country for water; the district of the Oxford canal is a very good place, it supplies other canals with water.

5500. Is it desirable to establish upon the river Thames fixed weirs of sufficient length instead of weirs with moveable tackle like those upon the Severn, such as would prevent any questions arising with regard to the millers?—It certainly would, but it would be a difficult thing to apply it to them all; to a certain extent the millers now control these weirs themselves.

5501. (*Chairman.*) Do you know how the upper navigation is managed, by flashes?—Yes.

5502. Sending a large volume of water down a reach to carry boats over the shoals?—Yes, that is a very ancient mode of doing it.

5503. And very injurious to the river?—Nothing more so; the origin of that really was nothing more than what they called a cow-flush; formerly cattle were driven into the water to form a little head.

5504. With an improved navigation would you abolish the system of flashing and deepen the pools by proper dredging?—Yes.

5505. And maintain them?—Yes; it would be

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merely a question at first of expense, but it would be a very improved system compared with flushing; there is great risk and danger in that practice.

5506. It has been stated that these flashes are now sent down in the summer to such an extent that they may sweep away a crop of hay?—Yes, they are very serious things.

5507. It is an extremely rude way of getting boats down a pool?—Yes, it is dangerous and extravagant, they cannot apply the water in a proper manner.

5508. (*Mr. Harrison.*) One miller lets it pass and another miller, with a large mouth, swallows it up and uses it very quietly?—The fact is, that it is injurious to all parties, and is conducted at great risk.

5509. In any improvement of the Thames you think flashes should be abolished altogether?—Certainly.

5510. (*Chairman.*) Has there been any scheme for embanking the Thames in this part of the river?—I have not heard of any.

5511. You are aware that the land on each side of the Thames, almost from Windsor to London, is becoming building land?—Yes, very rapidly.

5512. And that persons seek for sites on both banks of the river upon which to build residences?—Yes, very largely; places are taken up immediately after the property has been laid out, in fact I do not know where shortly a river frontage will be got on the Hampton Court side.

5513. Do you think it would be practicable to have intercepting lines of sewers on the two sides of the Thames?—I have always thought so, and when I established the Lambeth Waterworks I did construct a mile and a half of intercepting sewers.

5514. Do you think it is practicable to carry parallel intercepting sewers along both banks of the river?—Yes, but it is more a question of outfall, you must stop somewhere.

5515. Suppose you brought the sewage down into the proposed outfall of the metropolis, it would then be a question of pumping power?—Yes, of pumping power and an enlargement of the principal sewers, because they are no more, in my opinion, than large enough for the metropolis itself.

5516. You were one of the Government engineers appointed to inquire into the question and to settle the existing plans of metropolitan main sewage?—Yes.

5517. (*Mr. Harrison.*) Where does that intercepting sewer which you constructed discharge itself?—Into the Thames at the ferry above here.

5518. Is there much sewage taken into it?—A portion of the sewage of Surbiton goes into it, and then there is all the land drainage water with it.

5519. Does the sewage of Thames Ditton go into it?—A portion of it.

5520. If a scheme were introduced to extend this intercepting sewer past Kingston and Ham down to Putney, all the sewage so taken down by that intercepting sewer would pass to the low level outlet, and have to be pumped by the Metropolitan Board?—Yes.

5521. The Metropolitan Board would, in that case, have a fair claim upon the inhabitants of the upper part to pay for that pumping?—Yes; but I think the Metropolitan Board could scarcely be called upon, because really their main sewer would be insufficient to convey the quantity, or there would happen just what happens in this place; at certain times they could not convey the rainfall; now it goes into the Thames through storm water overflows, then it would go earlier through those storm overflows and so affect the river generally.

5522. Suppose the metropolitan sewers could carry it there would be a fair claim upon the inhabitants of the upper part for the cost of pumping, and therefore they might just as well pump themselves?—No doubt of it.

5523. (*Chairman.*) You are aware I dare say that the Metropolitan Board has agreed with a company to take the sewage of the northern side?—Yes, I believe so.

5524. Are you also aware that they have agreed with some parties to form a company to take the sewage of the southern side?—I have heard but I do not know that they have agreed.

5525. If a company or companies come into existence, and will take the sewage of the several towns and places on the banks of the Thames, at points to be fixed upon, do you think that these intercepting sewers to run parallel with the Thames might not have branch drains which would lead the sewage to pumping depôts, from which the companies formed for that purpose might take the sewage and do what they liked with it?—Yes; but I have so little faith in these companies. I should be happy to see such a scheme brought to bear, but I am sceptical about it.

5526. If sewage is as valuable as some people imagine it to be, and that it is valuable we certainly know, any company which undertook the responsibility of taking it from the intercepting sewers would have a fair chance of working it?—No doubt of it.

5527. There are storm water overflows in the low level sewers of London; similar storm water overflows would have to be provided for in the proposed intercepting sewers running parallel with the river?—Yes; where you have a rainfall in some cases probably seventy times multiplied, you cannot deal with it in sewers. It is of no use talking of pumping rainfall; there would be no reasonable limit to such works.

5528. If you know experimentally that it is absolutely necessary to provide in the metropolis for flood water going the natural way of flood water into the river, there can be no objection to providing for the same thing in other parts of the river?—Not the least; in fact, it is a necessary adjunct to any scheme of main intercepting sewers, but the quantity of flood water must be limited. Sewers cannot be made large enough to take the maximum of floods.

5529. When persons talk of absolutely purifying the Thames, they speak of a thing they hardly understand?—On the occasion to which you have alluded of my reporting with others upon the Thames, you will find that we state it would never be a clear river through the metropolis. The soil the water passes over is against that state of things; but the river will be made comparatively clear.

5530. The maintenance of the navigation, the maintenance of the weirs, dredging the pools, intercepting sewers, and the utilization of the sewage, will all tend to the purification of the water?—Yes; there is, however, one thing more which this Commission will probably direct attention to—that in all places connected with the river side sufficient attention is not paid to cleanliness. There are wharves, and there are urinals, and cesspits, and other filthy places, and during a heavy rain all the refuse passes down into the river. After a heavy rain a large mass of filth so worked down lodges by the side of the river.

5531. At the present time, as far as I can learn, it is no person's duty to scavenge the surface of the Thames?—No.

5532. It is the bounden duty of no person to cleanse the surface of the river from any foul matter that is thrown into it, or floats upon it, but with a proper Conservancy Board such work would of course be very easily effected?—Yes; all grass mown from the lawns at certain seasons is thrown into the river, and that is a very great nuisance. You may see sometimes a quantity of straw and hay coming down, and in some cases stable litter. Very great carelessness is displayed throughout.

5533. Every miller, if he cleanses his pond or millhead, passes the refuse and the weeds through his mill and sends it down the river; and if any person chooses to drown a dog it is no person's duty to take it out; but it is passed down by miller after miller, and floats till it is in a state of putrefaction?—Yes.

5534. (*Mr. Harrison.*) Have you had any analysis taken of the water from time to time?—There is a public analysis made once a month for the Registrar-General.

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5535. (*Chairman.*) Have you ever applied Dr. Clark's process to the river water here?—Yes.

5536. Does it precipitate carbonate of lime?—Yes.

5537. Does it reduce the water from 14 down to four degrees of hardness?—To five degrees; but it would be rather a serious operation to undertake on a large scale, and after all a very small quantity of the water is required of that soft nature. It is, however, a question of expense. We are supplying water to some large establishments in Chelsea at as low as 4*d.* per 1,000 gallons, and a very large portion of our whole quantity is supplied to the public at below 6*d.* realized, and if Dr. Clark's process were to be used it would require such an establishment that it would nearly double the expense by the time you had finished it.

5538. (*Mr. Harrison.*) You did not state what you thought would be a reasonable demand to make upon the water companies by way of annual rent-charge?—I have really not thought of it; but coupled, as the chairman suggested, with remuneration from the customers, I think it would be a question for a committee of the House to settle what should be given. I do not look upon it as a very serious expense. I think that the amount spread over an area comprising a large number of persons would be a very small rate.

5539. A very small amount levied upon the immense number of gallons taken annually from the Thames would supply a considerable sum of money for the purpose of maintaining the river above in a proper condition?—Undoubtedly. Still it must be done by getting it from various sources, and I look to trade as one source. The question is very important as it would cause the river to be kept alive, and all our trouble in the upper part of the Thames has arisen from a neglect of the navigation.

5540. (*Chairman.*) The railways having diverted traffic from the river it has been allowed to fall into a state of disrepair?—Yes.

5541. (*Mr. Harrison.*) If the river were put into a good state of repair do you think that it would really injuriously affect the railways?—No; because I believe there are goods that would come by the river that the railways would not care much about; for instance, we have goods at the present time kept at the railways for three weeks; the railways are not providing for such traffic.

5542. If the river was in proper condition pleasure boating would probably increase?—No question of it; it is very large here now, and I think many classes of heavy goods would also come up by the river; a great deal of foreign timber comes now by the river.

5543. Do you think it would encourage people to travel upon the railways from different points to get into communication with the river?—Yes; and it would give them very great facilities for conducting their business.

5544. (*Chairman.*) I see in the report of the Select Committee that the navigation fell off in its receipts. In 1845 the income was 14,113*l.* 6*s.* 2*d.*; in 1864 it fell off to 3,097*l.* 6*s.* 8*d.*, and the expenditure in that year was 3,173*l.*, shewing an excess of expenditure over income of 76*l.*?—Yes, and many things I believe were not paid for; some of the officers did not receive their salaries; the upper portion of the stream has got into a lawless state.

5545-6. You have stated that in going up to Windsor your boat meets with impediments at certain points?—Yes.

5547. If barges are subject to the same impediments they must, of course, carry much less cargo than they might carry if those impediments were removed at those points?—Yes.

5548. If the money earned by the barge would be in proportion to the weight carried the removal of the impediments would enable the barges to carry a greater tonnage and make them pay better?—Yes; there is an uncertainty about the trade now, and parties do not know if they establish boats and wharves, whether they will get them employed, and rather than continue in uncertainty they have gone out of the trade and continued their business by railway, whereas they would have continued on the river, because many towns lie away from the railways and thus traffic involves land carriage.

5549. I believe that many of the canals of the country are in conjunction with railways?—Yes.

5550. Many of them have been acquired by railway companies?—Yes.

5551. And all the slow traffic goes upon the canals?—Yes.

5552. There is a series of canals between Manchester and Leeds, and the traffic upon them is great although there are railways; there are also the Trent and Mersey canals; the Bridgewater canal maintains its own, and the Old river continues in work from Manchester to Runcorn?—Yes.

5553. (*Mr. Harrison.*) Do you concur with Mr. Leach in the evidence he gave "that had all the locks on the river been constructed at a sufficiently low level to allow deeply laden barges to use them during summer low water, and had the shoals been removed by dredging there is reason to believe that instead of the navigation being nearly abandoned an active trade would have been maintained"?—I decidedly do; I think we have every reason to believe it as on the lower part of the river, where attention is paid to the navigation, they do maintain a very good trade.

5554. (*Professor Way.*) As distributors of water to the inhabitants of London, you are naturally interested in the purity of that water?—Yes.

5555. Have you any power under your Acts or otherwise than at common law to prevent any nuisance in the stream?—No.

5556. In the judgment of Vice-Chancellor Wood upon the recent motion for an injunction against the Corporation of Kingston, he states that no witness appeared on behalf of the water companies to complain of any probable injury to be done to them by the sewage being thrown into the river?—We could not complain as to Kingston, we were above, and the stream goes only one way.

5557. I understand that you take your water some distance above the outfall proposed for Kingston?—Yes, more than a mile.

5558. (*Chairman.*) There being a constantly descending current?—Yes.

5559. (*Professor Way.*) We were told this morning that at times there is scarcely any water going over the lock at Teddington, is that so?—I have been often there and I have never seen it, there is certainly great leakage through the weir, and there is a fluctuation in the flow of the water down stream from the fact of its being arrested by mills; but taking the whole flow of the 24 hours we have not less by the gauges than 380,000,000 or 400,000,000 of gallons.

5560. You do not believe that at any time there is no water flowing over the weir?—No.

5561. If your supply pipe lay below such a town as Kingston you would object so far as you could to the water being polluted?—Yes, decidedly we should object.

5562. Suppose the people at Oxford should decide to sewer their town, and to turn the whole of its sewage into the Thames, would you take any action in that case?—I do not know whether the companies would combine to do it or not.

5563. You would readily join and would do anything that would add to the purity of the river?—Decidedly; the companies would do anything in reason.

5564. An idea has been thrown out in some of the affidavits that a collection of large quantities of solid matter above Teddington lock would not necessarily be got rid of by the flow of the water, but that it might contaminate the water much above the point at which the influx took place, and that there are certain chemical and physical laws which show that the injurious properties of matter can be carried through water in which there is no motion whatever; do you

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think it is worth while to consider whether the sewage being thrown in above Teddington lock might have any effect upon your water?—I do not think it would, we have a constant stream downward, and then during a large portion of the year we have the river refreshed by floods, which would wash anything away; the velocity is more than four miles an hour.

5565. Your supply of water was taken, I presume, above Kingston to anticipate such a possibility?—Entirely; I was anxious to conciliate parties and to get control over the Kingston sewage, and I offered, on the part of the companies to make an intercepting sewer through the town of Kingston to discharge its contents below the present railway bridge into the Thames.

5566. (*Chairman.*) That would have been objected to by the conservators?—I do not know whether it would have been, we never approached them about it; there were some objections on the part of the town and I withdrew my proposal.

5567. Do you know what the drainage area of the whole of the Thames is?—No, but it is very large.

5568. Is there any other point upon which you think you can give the Commission any information?—I do not know of anything.

The witness withdrew.

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Mr. JOHN JOHNSON (of Kingston) examined.

5569. (*Mr. Harrison.*) Do you reside at Kingston?—Yes.

5570. What is your occupation?—I am a fisherman.

5571. How do you fish?—I go out with gentlemen angling.

5572. You keep a punt?—Yes.

5573. How long have you followed that occupation?—Over twenty years.

5574. Have you observed in that time much difference in the water, in summer when the river is low?—There is a great deal of difference in the stream.

5575. In the volume of water?—It is not so fast now as it used to be, nothing like.

5576. To what do you attribute that?—I hardly know whether it is that land drainage above is better than it used to be; floods are quicker on and off.

5577. Has the sill of the lock above Thames Ditton been lowered?—I believe they have lowered it; they raised the bay.

5578. Have they dredged the river much between Hampton Court lock and Teddington?—Not lately, some years ago they did.

5579. They dredged it considerably?—Yes.

5580. Do you know whether the water up at Hampton Court lock is lower in summer than it used to be?—No, I do not think it stands lower, because they raised the back bay.

5581. You have observed a diminution in the velocity of the river?—Yes.

5582. Have you observed any difference in the purity of the water in the last 20 years?—The water is not so good as it used to be.

5583. What is the cause of that?—There must be more sewage discharged into it.

5584. Have you found that from your experience as a fisherman?—Yes.

5585. Do you find as many fish in the river now as you did 20 years ago?—Not the quantity.

5586. But a similar kind of fish?—Yes.

5587. It was stated at Windsor that the fish congregate at the mouths of sewers, and that fishermen go there to catch them; is it your experience that fish come to the mouths of the sewers to feed?—They do.

5588. Do you catch them there in any quantities?—Yes; more fish come to the mouth of the sewer than to other parts of the water.

5589. Do you catch many there?—No, I very seldom go there.

5590. Are they caught there in large quantities?—Yes; by people standing on the shore.

5591. Are they sold?—Some of them are, and some persons take them away with them. The majority of them are caught by double and triangle hooks.

5592. Are there any fishing rights in the neighbourhood of Kingston, has the borough any right to place a weir in the river?—I have always understood that they had.

5593. Do they exercise that right?—Not that I am aware of, I do not know of any.

5594. Is there any fishing with nets in this neighbourhood?—Not within the last few years; not since the Preservation Society put a stop to the 3-inch nets; that was the only net allowed, three inches in the mesh; and that is stopped too.

5595. What fish do you catch?—Roach, dace, barbel, chub, perch, jack, and some few trout, but only a few.

5596. They have made a ladder, have they not, at Teddington lock?—Yes.

5597. Do you know whether any fish have come up there?—I have seen fish in the ladder.

5598. What kind of fish?—Dace.

5599. Do you know whether they have succeeded in getting any salmon into the river?—Young salmon have been turned into the river, but I have never seen anything of them, nor of the artificially-bred trout.

5600. Have you seen the fish pass up that ladder?—I have seen them in the ladder, but I never saw them go through it. I have seen them at the Weir jumping by thousands.

5601. When you have been fishing on the river, have gentlemen expressed any annoyance from the smell arising from sewage?—We never go near the sewers on the reach; we generally go low down towards the lock.

5602. Is there much accumulation of mud on the banks of the river above and below the lock?—There is a great deal above.

5603. Does that create any nuisance in the summer time by smelling badly when exposed to the atmosphere?—It will in the height of summer.

5604. In what part of the river?—Both up by the promenade and likewise below the railway bridge.

5605. Have you found it very annoying?—Yes.

5606. To what do you attribute the nuisance?—It must come from the sewage.

5607. Have you fished in other reaches higher up?—Yes.

5608. In reaches where there is no larger population than there is in this?—I have fished at Hampton, Walton, Weybridge, Shepperton, and Chertsey.

5609. Have you found in those parts of the river a similar nuisance?—No, nor yet refuse on the banks.

5610. I believe you have brought with you some specimens of refuse to be found upon the banks?—Yes.

5611. Where were they taken from?—Below the railway bridge this morning.

5612. At different points, or just at one point?—From about 80 to 100 yards below where the sewer empties itself. (*Some specimens of very foul black slimy material found hanging on weeds and deposited on the banks of the river were produced.*)

5613. Have you tried with a stick to ascertain the thickness of this mud?—No.

5614. Have you observed what becomes of the sewage after it leaves the sewer?—It mixes with the Thames water and goes away down the river.

5615. In what condition do you see it floating in the water?—Sometimes there are large black masses of it more like black froth than anything else.

5616. Is that what comes out of the sewer?—Yes.

5617. Have you observed at any time where this

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deposit is formed bubbles of air coming to the surface of the water ?—If you put a stick or a rake down, you will see bubbles come up as thick as possible.

5618. Without stirring it have you ever observed that ?—I do not know that I have.

5619. Have you ever observed any black deposit rise from the bottom of the river to the surface ?—Yes ; I have seen it come up in patches and float about.

5620. Of what size might those patches be ?—Sometimes they come up as big as that inkstand, and sometimes larger.

5621. Have you ever examined them ?—No, I never took them out. This stuff comes up and floats about, and away it goes down with the stream.

5622. (*Professor Way.*) It sinks again I suppose ?—Yes ; and it goes away again.

5623. Do you think the fish have diminished in quantity during the 20 years you have known the river ?—Greatly.

5624. Is there more fishing going on now than there was 20 years ago ?—Yes, more than ever there was.

5625. Then it is a question between the destruction of the fish by the sewage and their destruction by angler as to the quantity remaining ?—I do not know how far that may be case since the 3-inch net has been done away with. I do not think rod and line can hurt the river.

5626. You do not think that the increased number of anglers would account for the diminution of the fish ?—I think not.

5627. Therefore you would attribute that diminution to the sewage ?—I do not know what else it can be.

5628. How do you account for fish feeding at the entrance of the sewers upon that which you say destroys them ?—They will come there.

5629. Do you think it is poison to them there ?—I cannot say what effect it takes upon them.

5630. Is it not more probable that it becomes poison to them where it is deposited on the banks of the river, and where it becomes fœtid, and the gases arising from it there poison the fish ?—It may be so, I cannot say.

5631. But you state the fact when you say that the number of fish is diminishing ?—Yes ; I have picked up this season seven large Thames trout. I picked up one the other day dead, 2 feet 4 inches long. I picked up one this season 2 feet 9 inches long—a fish that would have weighed 15 lbs., and I have picked up several dead fish that would have weighed 5 lbs., 6 lbs., and 7 lbs. each. I sent word to the committee at the time.

5632. Did you find any small ones dead as well ?—I have not seen any small ones dead.

5633. (*Chairman.*) Was there any appearance of injury upon the large ones ?—I looked over them carefully, and I found no bruising. I opened the mouth and looked in to see whether there were any hooks.

5634. (*Mr. Harrison.*) What do you think caused their death ?—I do not know.

5635. When they come to the size you have mentioned, do you suppose that they die of old age ?—Very possibly, the large one was very thin.

5636. If their death was caused by the poisonous sewage, would not that poison affect the young fish as well as the very old ones ?—I should say so, if it arose from that.

5637. Does refuse come from any manufactory or on this reach?—Not that I know of.

5638. Are there any gasworks in the town ?—Yes.

5639. Does any of the refuse pass into the river ?—I think not.

5640. What do they do with tar and other refuse ?—They have barges up, they take it down to the wharf in carts, and they run it into the barges through a pipe, and it is taken away.

5641. Have you any knowledge of there being any sewer or culvert from those works into the river ?—No ; there is often some refuse spilt in carrying it away.

5642. Is there a tannery on the river ?—Yes, just above Kingston bridge.

5643. Is that upon the Hog's Mill stream ?—It is below the mouth of the mill stream, it is nearer the bridge.

5644. They use lime, do they not?—I believe they do.

5645. Do you know what they do with that lime ?—There is a great deal of discharge that comes in at times from the tannery into the river.

5646. Is it a large tannery ?—I do not know the extent of the business they do, nor how many hands they employ.

5647. What appearance has the discharge ?—It is of a reddish brown, and sometimes of a lighter color.

5648. Have you ever seen any fish lying about dead when that discharge has taken place ?—I never saw it kill any fish, but if they lie there all night in the punt's well, they will be dead in the morning.

5649. At what point would the punt lie ?—40 or 50 yards below it.

5650. Below where the refuse is turned out ?—Yes ; I have had 10 or 12 dozen of fish, roach and dace, all dead in the punt's well this season in a morning.

5651. Do you mean that you could take your punt to different parts of the river and see whether the fish in the morning were healthy, sick, or dead, and form thereby some notion of the purity of the river ?—If you laid the punt on the other side of the river in the summer time you would have your fish all right, I mean in the conservancy roads on the other side.

5652. If you laid the punt on this side of the river, would the fish be affected in the morning at any time or merely when the refuse was being discharged ?—I have noticed it more when I have seen the color coming down ; when I have jumped into my punt all my fish have been turned up.

5653. That would be about 40 yards below the discharge from the tannery ?—Yes.

5654. Have you ever laid your punt in a similar way about 40 yards below the mouth of the sewer at the railway bridge ?—No ; the towing-path is there, and the barge lines would pull the boat away.

5655. Then you cannot say distinctly whether the sewage would have the same effect ?—I cannot.

5656. Have you when you have been fishing near Teddington lock in a very dry season observed the quantity of water going over the weir ?—Sometimes the bays are dry.

5657. You have known them quite dry?—Yes ; so dry that you might walk over and the water would not be over the sole of your shoe. There are two bays ; but then there is always a certain amount of leakage through the weir.

5658. Is that leakage considerable ?—Yes ; there is a good drop of water that runs through the weir always, because the bays have been fresh made with stone ; they have been very well made ; they have got a plank that runs along the top, and when you put it into a groove it shuts the bays up as tight as possible.

5659. Have you seen the water so little in quantity that you could walk across the bays ?—Yes ; without getting your feet wet ; not half an inch deep.

5660. Was there much leakage through the weir at the same time ?—There always is a certain amount of leakage ; they cannot shut the whole in quite tight.

5661. What is the effect upon the river opposite the waterworks when they are pumping sharply, is there much difference in the velocity of the stream above and below the reservoirs ?—I do not think there is much difference.

5662. You do not think that the pumping makes any difference in the velocity of the stream above and below where the water enters the reservoirs ?—I do not think you can see much ; you will find the water sometimes a great deal lower on the Monday morning.

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5663. (*Chairman.*) Do you think the mills above stop the water up ?—It is very possible it is so. The up country mills in dry weather all shut down to fill their mill-heads up on Sunday ; you may account for it in that way.

5664. (*Professor Way.*) As a rule, is there a marked difference on Monday ?—In the majority of times. I always look for it on Monday.

5665. Do you notice it always on Monday ?—Yes, in summer time it is Monday ; it has got to be a standard thing to say "We shall have less water and "more steam to-day."

5666. Have you ever been out on the river on Sunday ?—Yes.

5667. How has it been then as compared with the other days of the week ?—Like this : on Sunday evening you might swim a skiff on the water with two people in her where I moor her and get out, but on Monday morning that skiff would be on the ground when one person stepped into her, or perhaps on the ground herself.

5668. Have you remarked the time it takes after heavy rains before the floods come down here ?—We get the Mole water first, if the rains are high up in the west it is a little time afterwards that you get the second flash from the up-country water.

5669. How long is that after the flood from the Mole comes down ?—If the Mole water came down to-day you would not feel the up-country flood before to-morrow morning, or later than that.

5670. Do you find the up-country flood come down sooner or later after heavy rains than it used to do ?—I think it comes sooner, and it is sooner gone.

5671. Do you find that it rises to as great a height as it used to do?—We had, I think, in 1852, a very heavy flood ; we have had 5 or 6 feet, 4 feet 6, 5 feet, or 6 feet now and then of water in each winter.

5672. Do you think the ordinary floods are higher now—those that come down rapidly and pass off rapidly—than similar floods used to be in your recollection ?—I really do not think they are.

5673. They come down more quickly and pass off more quickly, but they are not higher than they used to be ?—I think not ; the water used to hang longer.

5674. Do you ever find, when you are fishing, sewage matter floating about so as to interfere with your lines ?—We find it on the night-lines that we lay for eels.

5675. You find it adhering to them ?—Yes.

5676. What is the appearance of the night-line then ?—It is covered with sewage, the same as the stuff I have shown you, bits of the line are smothered with it.

5677. Do you find it adhering after one night ?—Yes.

5678. Who ballasts the Reach between Hampton Court and Teddington ?—There are four or five men licensed by the Board of Conservancy who ballast.

5679. Do they ballast under the directions of the Conservancy ?—They are restricted to certain rules ; they must not ballast within so many yards of the shore, and not over a certain depth.

5680. Do they attend to those rules ?—At times.

5681. Have you found any inconvenience from their not attending to them ?—You will find, when you are shoving up the punt, you are often out of 2 feet 6 inches into 8 or 9 feet of water, and out of one ballast hole into another.

5682. What is the effect of that upon angling ?—You cannot fish upon any of that ground, and not only that, but it cuts up the spawning ground.

5683. You say that you accompany gentlemen to fish ?—Yes.

5684. Is the fish caught of any commercial value ; would it sell to any extent in the market, or are they caught merely for pleasure ?—Gentlemen do it for pleasure.

5685. Supposing it was looked upon as a matter of trade, what amount of fish have you known to be caught in the season ?—That would all depend upon certain things ; at one time this season dace were bringing half-a-crown a dozen.

5686. How many such fish could be caught in a day with one rod ?—I have caught 8 dozen, 9, 10, 12, or 14 dozen.

5687. From 5*s.* to 10*s.* per hundred would be the value of the fish ?—Yes.

5688. But are these fish sent to market ?—Yes ; a great many of them are sent to London, to Billingsgate.

5689. Those that are caught with the rod ?—Yes.

5690. (*Mr. Harrison.*) How many punts are there on this reach that are let out to hire ?—I do not know exactly how many there are ; I think there are 21 or 22 at Hampton Court, and about four or five at Kingston.

5691. How many are there at Richmond ?—I do not know how many there are at Richmond ; there are 12 or 14 at Teddington.

5692. How many are there at Thames Ditton ?—There are perhaps five or six.

5693. Do those punts pay anything for the right of fishing on the river ?—No.

5694. They pay no rental to the conservators ?—No.

5695. The gentlemen fishing on the river in those punts merely pay the owner of the punt and the man who attends them ?—Yes ; for the use of it.

5796. (*Professor Way.*) What is the average cost of a day's fishing ?—8*s.*

5697. (*Mr. Harrison.*) Does that include the boat and the man ?—Yes ; but suppose two came it would be the same.

5698. (*Chairman.*) You charge 8*s.* a day for the punt and the man ; do you provide bait for that ?—Yes.

5699. (*Professor Way.*) If there are two persons they divide the expense between them ?—Yes.

5700. (*Chairman.*) Suppose there are four ?—It is seldom that we take four ; we can get on with three.

5701. What number of hours do you call a day ?—It all depends upon the time of year ; at this time of year I should say a day would be from about eight or a little after eight, till half-past four or five, and in midsummer from about seven o'clock in the morning till as long as you can see at night.

5702. You would be out with your punt all that time for 8*s.* ?—Yes ; others will do the same.

5703. What is a punt worth ?—That all depends upon what it is built of.

5704. Take one of the best construction ?—You would not get a good English oak punt for less than from 14*l.* to 15*l.* 10*s.*

5705. What is the price of the cheapest kind ?—Built of oak and pine from about 8*l.* to 10*l.*

5706. What tonnage do you reckon them ?—I never measured them in that way.

5707. What size are they ?—About 21 feet 6 long, and about 4 feet wide.

5708. What depth are they ?—From 16 inches to 17½.

5709. What depth of water do they draw when you have got three fishermen and yourself on board ?—They draw about 4½ inches, or perhaps 5 inches ; some draw more than others ; oak punts sink deeper into the water.

5710. Are they entirely flat bottomed ?—Yes.

5711. Some I suppose will draw down to 6 inches ?—Yes ; in a heavy stream, and you have but a short lift, then they will draw 6 inches.

5712. (*Mr. Harrison.*) Have you observed whether the growth of weeds in the river has increased ?—Yes ; there has been a great deal more of weeds in the last two or three seasons.

5713. Has the navigation at the same time not been diminished ?—I do not believe it has been diminished, the weed has not much got into the channel about here.

5714. Then the argument, that in the upper reaches of the river the navigation being taken off has encouraged the growth of weeds would not apply here ?—Not about here.

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5715. To what do you attribute the more luxuriant growth of the weeds now?—I cannot attribute it to any other thing than that the stream is so much slower than it used to be, and that the weeds get a better hold of the ground.

5716. Have you seen the American weed at all?—I do not know that I have.

5717. What kinds of weed have you about here?—We have the long weed that we call the ribbon weed, the small round weed, and the rush, and the water lilies.

5718. Do you think those have increased a good deal during the last few years?—Yes, they have, in this reach of water.

5719. Has the depth of this reach altered within the last few years?—They have ballasted it a great deal.

5720. That would increase the depth of the water?—Yes.

5721. That could not, therefore, be the reason?—No.

5722. To what do you attribute the growth of those weeds, if the depth of the water has been increased by ballasting?—There was one bulk of weed that used to be just below the railway bridge when the water was from 3 to 4 feet deep, that has been all cut up by the ballasting, and the weed comes down below.

5723. (*Professor Way.*) The river has not been uniformly ballasted, as I understand you?—No; it is all in hills and holes.

5724. (*Mr. Harrison.*) Is there much of a hole below Kingston bridge?—Yes, below the railway bridge, or between Kingston bridge and the railway bridge, that was where the steam dredger cut it out when they came to make the railway bridge.

5725. There is a hole below the railway bridge?—Yes.

5726. Is there a hill below that hole?—Yes; opposite Mr. Nelson's house.

5727. What depth of water is there on it in summer time?—It runs shallow in close into the bank; there are about 18 inches or 2 feet of water, and then it runs out to 4 or 5 feet; the current is rapid there in summer time.

5728. Have you observed at what depth the weeds cease apparently to grow?—I cannot say that I have noticed that.

5729. Do you know that when you are in tolerably deep water there are not many weeds?—Yes.

5730. As the water gets shallow, a larger quantity of weeds then appear?—Yes; the slower the stream gets, in all the eddies, and where there are a few islands there are weeds.

5731. (*Chairman.*) What is the spawing season for the fish in the Thames?—From the 1st of March to the 1st of June.

5732. Where do they spawn?—On the hills generally in shallow water.

5733. Do you think that dredging destroys a large quantity of spawn?—No doubt of it; there is no hill for the fish to go on.

5734. Do you think that the sewage refuse has an injurious effect upon the spawn?—I should say if it was washed down over the hills and covered the spawn it would kill it.

5735. Are there many swans on this reach?—Yes; there is a fair share of them.

5736. Do they destroy the spawn by eating it?—When the spawn is on the boughs they can get at it.

5737. They eat it then?—Yes; and you can hardly drive them away; if you do, they will come back again when you are gone.

5738. Do the swans eat live fish?—I never saw them catch live fish; but if you take dead small fish out of the well and throw them to the swans, they will often eat them.

5739. Are there any other birds that feed upon the spawn on the bank of the river?—Not that I know of. There are very few people who keep ducks; there are a few.

5740. Do you think that the number of swans in the river, and their eating the spawn, may account for the diminution in the quantity of fish?—No; I do not think they have much to do with it.

5741. Are there more swans now than there were formerly, or about the same number?—I think about the same number.

5742. To whom do they belong?—I believe some of them belong to Her Majesty, some to the Dyer's Company, and some to the Vintner's Company.

5743. Do they take the young away for any purpose? Are they killed, so as to keep down their numbers, or are they left to increase?—They come up the first Monday in August, and catch all the swans, and mark them; some they take away.

5744. (*Mr. Harrison.*) Do they mark them in such a manner as to distinguish those that belong to the Crown, to the Vintner's Company, and to the Dyer's Company?—Yes.

5745. (*Chairman.*) There are days, I believe, when the citizens come up the river swanhopping?—Yes; it is generally the first Monday in August.

5746. You do not think that the swans materially affect the quantity of fish in the river?—I really do not.

5747. (*Professor Way.*) You think that if the sewage does not directly kill the fish, it may lessen the quantity of fish in the river by destroying the spawn?—Yes; by smothering it.

5748. (*Mr. Harrison.*) Do you think that the fish like to deposit their spawn on a gravelly bed?—Yes; on a shallow bed, so that the sun may light on, and get to it, and if it is all reduced into dead deep water they will go somewhere else.

5749. Up the brooklets?—Yes; where they can find ground that is natural to them.

5750. If there is sewage floating in the river, and adhering, as you say, to the boughs, I suppose the fish would not deposit their spawn where the sewage adheres?—I do not believe they would attempt it.

5751. (*Professor Way.*) Or if it had been deposited there, the sewage would smother it?—Yes.

5752. Do you make any distinction between the kind of fish which do like sewage, and those which do not?—All the coarse fish, breams, roach, and dace will come to it. Trout will not come near it.

5753. In point of fact, it is the most valuable fish that is most affected by it?—Yes; the Thames trout.

5754. (*Mr. Harrison.*) Do you think the jack destroy the Thames trout?—I do not think they do, because they have so much other food in the shape of roach, dace, and gudgeons. I do not think they would go hunting after trout.

5755. In the upper reaches of the river as well as in some of the tributaries which are trout streams, the jack kills the trout?—Yes; being trout streams, the bulk of the fish would go up there.

5756. (*Chairman.*) Where do perch spawn?—A great deal on the boughs, up ditches, and in back water.

5757. They attach their spawn to weeds and boughs that hang in the water?—Yes.

5758. What other fish besides perch do that?—Jack will do the same.

5759. Which are the fish that deposit their spawn in the gravel?—Roach, dace, barbel, chub, and trout.

5760. Then it would be the spawn of jack, of perch, and of other fish that attach their spawn to plants that swans devour to the greatest extent?—Yes.

5761. And swans may also live upon the spawn that is on the beds?—Yes; because they are always digging down for their food.

5762. Is there any person to look after these swans and feed them at intervals?—They take them up in winter when the ice runs down.

5763. Where do they take them?—They generally take the swans about here up to Ditton. They take them out of the river.

5764. Do you not receive a premium for the eggs

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for taking care of their nests?—If you make up a nest they pay you for the young ones when they come up.

5765. How much do they pay you for a nest?—I never took any up, but I always understood that it was either 2*s.* or 2*s.* 6*d.* for a young bird when the swanhoppers came up, if the parties had looked after them and made up the nest. I never had anything to do with it myself.

5766. (*Mr. Harrison.*) Does the tide ever rise so high as to come over Teddington weir?—I have seen it float the paddles.

5767. Not to affect the reach above Teddington?—Yes; I have known that now and then.

5768. How far have you known it come up?—I have known it swell the water here at Kingston under a heavy tide of water; and up above dead still I have known it rise 8 or 9 inches.

5769. If there had been no weir it would have flowed in that case to Hampton lock?—I should say it would quite.

The witness withdrew.

T. C. Hansard, Esq.

THOMAS CURSON HANSARD, Esq. (of Kingston), examined.

5770. (*Mr. Harrison.*) You are resident in this neighbourhood?—I have resided here since 1849.

5771. During that time have you become acquainted with the river Thames?—Yes; very well, from Hampton down to Teddington, and below to Twickenham.

5772. Have you observed in that period much difference in the Thames as to the quantity and the quality of the water?—Certainly: for the worse, and a smaller quantity.

5773. To what do you attribute the diminution in the quantity of the water?—I attribute it principally to the abstraction of water by the water companies. There are natural causes in dry weather, which I do not speak of.

5774. Have you observed the floods at all, as to the rapidity with which they come down after wet weather?—Yes; I think I have noticed that they come down more rapidly, and they certainly run off more quickly. We used to expect, on a rough calculation, that what we call the Oxfordshire water would appear here about three days after heavy rain. Now it is about the close of the second day.

5775. The last witness stated that he had not observed any great difference in the height to which ordinary floods rose?—No, I think there is not much difference.

5776. Is there much water from the Hog's Mill river?—In wet weather a considerable amount comes down; but the immediate cause of flooding and discoloration here is the Mole.

5777. That comes from a very considerable distance, does it not?—It comes from the extremity of Hampshire, creeping through a great extent of country.

5778. Is the quantity of water brought down by the Mole sufficient to affect the Thames materially?—Yes; I have been surprised at it. I examined it during the late floods, and I was astonished to see the quantity that came down.

5779. Have you taken any observations as to the quantity of water that came down?—No.

5780. Does it bring down much debris with it?—There is a great deal of discolored water, but I think no solid material.

5781. Do you know whether land drainage has been carried on to any extent in the basin of the Mole?—I know parts of the Mole in which there has been drainage and the country opened, so that the water would run into the Mole more rapidly.

5782. Do you think that that drainage has had any effect upon the quantity of water coming down the Mole in the summer and in the dry weather?—No. I think that the general rule applies, that after rain the water runs into the watercourse more rapidly, and runs out more quickly.

5783. You think it does not affect the summer flow?—I think not.

5784. You are acquainted, I suppose, with the arrangements at Kingston and Surbiton for taking away the sewage?—Yes, generally. I am not a householder or a ratepayer.

5785. Where do you reside?—I have permanent apartments here.

5786. What was the system adopted until lately for getting rid of the sewage in Kingston?—The sewage was brought into the corporation sewers as they then were. Then it flowed into an open drain where the railway embankment now is. There was formerly, before the towing-path was made, a ditch running from the river above the railway bridge, parallel to the river and re-entering it at the present Iron bridge near the towing-path. This ditch was in fact a branch of the river, making the present withy bed an island. The open drain first mentioned discharged into this bywater.

5787. Did that drain carry off the sewage direct from the houses of Kingston?—No; there were old drains in Kingston, which received the sewage from some of the houses. In other parts I believe there was a system of cesspools.

5788. From the character of the soil on which Kingston is situated, do you think that those cesspools would discharge much fluid into those drains?—The soil is extremely permeable. No doubt the well water was most beautiful, and so far as I know it was not affected by the cesspools. There was no drainage from the cesspools into the water strata.

5789. That could only be from having the cesspools built watertight?—Kingston is a very ancient town, and many of the cesspools were mere pits, and many were boarded or bricked; but the board and brickwork was old and rotten.

5790. At Surbiton a regular system of sewerage has been carried out, has there not?—Yes.

5791. Surbiton is quite a modern town?—Yes; and as the sewage goes direct from the houses into the sewer recently built it is carried direct into the Thames.

5792. The outlet of that sewer is above Kingston?—Yes.

5793. Have you observed the effect of the sewage issuing from that sewer on the banks of the river?—Yes. That part of the river where the Surbiton sewer discharges into it is divided by an island called Raven's Island or Messenger's Island. The Surbiton sewage is all discharged into the southern branch, and fouls it very greatly.

5794. Are you in the habit of going on the river in the summer time?—Yes.

5795. Have you experienced any inconvenience from deposit upon the banks of the river near Kingston?—Certainly—both from foul deposit upon the banks, and from offensive smells.

5796. Apart from the question of using the Thames as a supply of water, you think that the nuisance arising from the discharge of sewage into the river is of sufficient importance to call for a remedy?—Certainly.

5797. Do you know the opposite side of the river, Hampton Wick?—Yes.

5798. Is there any land situated there that would be suitable for the purpose of sewage irrigation?—I think there is plenty of land that would take all the sewage of Hampton and Hampton Wick; but the level is so low that I do not know how it could be practically done.

5799. Have you remarked during the last few years any increase in the growth of weeds in the river?—Yes.

5800. Within what period?—They have been increasing in the last two or three hot summers very much.

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5801. To what do you attribute that?—To the water being lower and to the current being slower, and to the foul water affording more pabulum.

5802. (*Professor Way.*) The water being fouler because it was in a smaller quantity?—Yes; the proportion of matter that plants take would be greater in proportion to the diminution of water.

5803. (*Mr. Harrison.*) The foulness of the water would be increased?—Yes.

5804. From the peculiarity of the last two seasons, and from there being so small a quantity of water coming down?—Yes; the foulness has been more marked. They have been dryer summers than ever I remember.

5805. (*Professor Way.*) You do not mean that the positive increase of sewage matter has been so great, do you?—Yes; the positive amount has greatly increased, because the whole Surbiton sewage has been thrown in; and there must have been an increase from the increase of Kingston.

5806. I understood you to say that the increase was in two dry summers?—Yes; the increase of the foulness.

5807. During which dry summers the smaller quantity of water was favourable to the growth of weeds, and the increased strength of the sewage matter in the water was favourable?—Yes.

5808. You do not regard weeds as the direct result of an increase of sewage?—I imagine so, because when there is more sewage there is more growth of weeds.

5809. (*Mr. Harrison.*) You consider that it is a growing evil from several causes?—Yes.

5810. A diminution of river water by the water companies, an increase of population on the banks of the river sending more sewage into it, a diminished quantity of water flowing down, a greater pollution of the river, and the consequent encouragement of the growth of weeds?—Yes; and the diminished rapidity of the stream. With regard to the question which has been asked whether there is in the neighbourhood of Kingston any land suitable for the application of the Kingston sewage, I have some observations to offer. The road from Kingston to London runs upon an ascending ridge to a range of hills, which runs nearly east and west. Taking this range on the south, the Thames on the north, and the London road on the west (the hill and the river meet at Richmond at the Duke of Buccleugh's villa), there is enclosed a basin 3 miles long with an extreme width of 1 mile or 1¼ miles. This area it seems to me would afford a convenient site for disposal of sewage. The soil near the river is rich alluvion, but in the interior is chiefly sand or gravel, covered in parts with a coating of clay. Then as to level the land rises to a height of from 27 to 37 feet above the river, then falls somewhat towards Richmond Park, and there rises rapidly again. The general inclination between Teddington and Richmond is towards the Thames, and the small valley has a drain of its own called Latchford ditch. The chief proprietors of the land in this basin are Lord Liverpool's trustees, Lord Dysart, and the Duchy of Lancaster. Whether these proprietors would part with their land for the purpose of sewage irrigation I do not know, but considering that the disposal of sewage by some means other means than throwing it into the rivers is now an admitted public necessity, and will probably soon be a duty forced upon towns by the legislature, I think it would be no injustice to give to towns compulsory powers to take land for the purpose of sewage irrigation from unwilling proprietors. It may be objected that the area I have suggested is all building land. I admit that the land on the river side affords most valuable building sites for first-class houses. I admit also that the land bordering the Upper Richmond road is valuable for an inferior class of houses. At the same time it is to be remembered that nearly all that is "common fields," and cannot be built upon without an Act of Parliament. But as to the land between Kingston and Richmond Park it is very low, and receives the rainfall and drainage from the park and from Kingston Hill which is now being extensively built upon. When the land on the river side and the land bordering the Upper Richmond road have been built upon, this interior land would be quite shut out from prospect; in short, in my judgment, would not be valuable building land, but would be a convenient place for sewage irrigation.

The witness withdrew.

Adjourned till to-morrow at 11 o'clock.

Kingston, Thursday, 14th December 1865.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., in the Chair.

John Thornhill Harrison, Esq. | Professor John Thomas Way.

Godfrey Lushington, Esq., Secretary.

Charles Walpole, Esq. (of Surbiton) examined.

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5811. (*Chairman.*) You are chairman of the Surbiton Improvement Commissioners?—Yes.

5812. How is the Commission constituted?—Under a private Act of Parliament passed in the year 1855.

5813. What is the population of Surbiton?—Speaking roughly, about 6,000.

5814. Is Surbiton an increasing district?—I consider it to be so.

5815. It has grown up within a recent period?—Since the South-Western railway has had a station there; that is now some 25 years ago.

5816. Have you a good supply of water at Surbiton?—Yes, we are supplied by the Lambeth Waterworks Company.

5817. Do you know the acreage of your district?—The district defined by the Act follows the boundaries of the ecclesiastical district which has been carved out of the parish of Kingston. A great part of it is agricultural still. There are two or three large farms under tillage.

5818. Have the commissioners carried out any system of sewerage since they have been in office?—They have.

5819. At what cost?—About 5,000*l.*

5820. In main sewerage and lateral drains?—I do not speak of house drainage, but of our main intercepting sewer and certain lateral drains which are auxiliary to it; I think they cost about 5,000*l.*

5821. Did you borrow the money for those works, or did you pay for them out of the rates?—None of it was paid out of the rates. We borrowed it all, except a contribution to the extent of about 1300*l.* which we received from owners of land who hoped to benefit eventually by the works executed.

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5822. Does any part of that debt remain now unpaid?—Yes, I believe all but 100*l.*

5823. What is your annual assessable value?—It is over 47,000*l.* and under 48,000*l.*

5824. Do any houses in Surbiton use cesspools?—Some few are solely relieved by cesspools.

5825. Is that in consequence of your main sewer not going near enough to them?—Yes, we could not approach them without incurring excessive expense.

5826. Have you compulsory powers under your Act, if you took the main sewers sufficiently near, to compel owners of houses to join their house drains to your sewer?—Yes, the distance is 100 yards.

5827. Do your main sewers extend to Surbiton hill?—Yes.

5828. Do the houses use the main sewer?—Yes, almost entirely.

5829. Do you know Mr. Lambert's house?—Yes.

5830. Does he use it?—He does not; the fall down of the ground from Mr. Lambert's house enabled a few houses in his locality to be relieved by a short sewer that was made anterior to the construction of our main sewer.

5831. Do you levy a rate uniformly over all the district, whether the main sewer is used or not?—Under the provisions of the Act we are to form a drainage district, and each district contributes to the works for its own particular locality.

5832. You have separate districts?—Yes, four.

5832*a*. Do you find that system to work equitably?—Yes; I believe very equitably and satisfactorily.

5833. You have varying rates in those four districts?—They vary a little, but they have kept nearly together; there is not a pin of difference.

5834. Where does the liquid sewage ultimately go?—The sewage of the main sewer falls into the large sewer belonging to the Lambeth Waterworks Company, which, under our Act of Parliament, we are empowered to use.

5835. Where does that empty itself?—That I believe empties itself into the river Thames; but we empty our sewage into the Lambeth Waterworks Company's sewer. We have made no entrance into the Thames.

5836. Are you aware that there have been proceedings in Chancery against the Corporation of Kingston relative to that matter?—I am.

5837. Was there any talk of including Surbiton in those proceedings?—I think if there was any inclination to do so, it was found that we were not sufficiently culpable for anybody to attempt to include us in such a charge.

5838. You say that Surbiton is a growing place?—I think so.

5839. Do you think that that growth will continue?—I think it will continue, but it will not be so rapid as before, because the best sites are already occupied.

5840. (*Professor Way.*) If you are to keep the river pure and uncontaminated, I suppose that tributaries are of as much importance pro tanto, as the main river?—I consider them of more importance. A small stream polluted is a more injurious thing than a large one, with a very large body of water in it. I believe that some of the tributaries are more open to objection than the river Thames, in the neighbourhood of Kingston.

5841. Why do you think that Surbiton should be considered free from objection?—I consider that we are very little open to attack; but I may as well, perhaps, a little explain myself. In the first place, what we do is under the powers conferred upon us by our Act of Parliament, and I do not believe we could have done otherwise. Secondly, the water companies, in purifying the enormous quantity of water with which they daily supply the inhabitants, throw out an enormous body of water back again into the Thames, and that large body of water is returned to the Thames through the large sewer which we were empowered to enter, so it must appear plainly that whatever quantity of sewage enters the Thames through that channel goes in diluted by an enormous body of water, and I believe is quite innocuous *per se.*

5842. (*Mr. Harrison.*) The sewage of Kingston is carried into a still larger body of water?—I say nothing about Kingston, but I speak of any town that empties its sewage ripe and green into the river. Whether such a state of things is or is not a nuisance is a matter of opinion; but inasmuch as a single glass of port wine is a much stronger dose than a glass of port wine poured into six gallons of water, I conceive that if it is obnoxious to put sewage into the Thames, that, which comes in exceedingly diluted is comparatively innocuous.

5843. I presume that in both cases the solid matter carried into the river is deposited in the reach, the dilution would not make any difference in the quantity of matter deposited?—I do not say that it would, but upon that point I would say that I do not believe one atom of solid matter either from Kingston or Surbiton goes near London. I believe it is all preserved by Teddington weir.

5844. (*Professor Way.*) Teddington weir may possibly contain a very large quantity of solid matter?—I cannot speak to that accurately.

5845. I suppose the dilution would have this effect, that the objectionable matter would become a less obvious and visible nuisance on the spot; but, as Mr. Harrison has suggested, it would not alter the fact that the objectionable matter was there?—When I speak of a nuisance, I suppose a nuisance injurious to health, which is the primary object of all these arrangements; and I conceive that extreme dilution would render this sewage perfectly unobjectionable to the smell, or in any other way injurious to the health of the inhabitants on the banks of the river. When you talk of analysis and all that, I leave that to the learned.

5846. Referring to your illustration of a glass of port wine put into six gallons of water, I suppose if you continued to put glasses of port wine into the six gallons of water, it would by-and-bye be rather a strong liquid?—Certainly not, if you add six gallons of water every time. It would never get any stronger.

5847. But the river Thames is a fixed quantity with all its fluctuations between flood and drought, and if the same privilege is to be exacted in the case of each town, it may come to a very serious question?—Possibly.

5848. (*Chairman*) It is said that many a mickle makes a muckle?—Yes; and I do not question what has been said, that by degrees, the deposit may cause an accumulation at the bottom of the river at Teddington. The thing is so plain that nobody would contradict it.

5849. (*Mr. Harrison.*) Do you use the river for boating purposes?—Yes, continually.

5850. Have you ever perceived during the summer season when the water is low any disagreeable effluvium from the banks of the river?—I do not think I have; but of this I am certain, that if there be any such effluvium in the vicinity of Surbiton, it arises from other causes than the sewage from the main sewer I have spoken of made by the Surbiton Commissioners.

5851. Have you perceived any effluvium from the banks below Kingston?—I never did, but perhaps my sense of smell is not very acute.

5852. It has been stated in evidence that such a disagreeable smell has been perceived along the Queen's parade?—It may be so. I never perceived it that I know of in boating, but I repeat that there are plenty of entrances to the river Thames in that locality which may cause that smell, over which I and the body to which I belong have no control whatever.

5853. Your opinion is, that the solid matter of the Surbiton sewage will be retained at this side of Teddington lock and never reach London?—I am reminded by the surveyor that it is in a great measure diluted, and ceases to be solid matter before it gets down to Teddington, but I adhere to my opinion, that if there is solid matter, it does not pass Teddington weir.

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5854. Where do you suppose the solid matter from Surbiton is deposited ?—I should suppose about Teddington weir.

5855. Have you ever observed the deposit on the banks of the river below Kingston ?—I cannot say that I have had my attention drawn to anything of the kind. My belief is, that such mischief as arises from pouring the sewage into the Thames in our particular case is very much modified and remedied.

5856. You would contend I think that there is a distinction in your case ?—I think there is so broad a distinction as to strike most men's minds, and in any legal matter that affected Kingston we should have been quite prepared to have stood upon it as a broad distinction.

5857. (*Chairman.*) In the event of any legislative enactment to prevent that fouling of the Thames which now takes place, do you think that you would be exempt from its application and not your neighbours ?—I will answer that question a little at length if you will allow me. When we began at Surbiton, there were many patent nuisances in the shape of open ditches, causing great danger to health. To quote an authority which some gentlemen present will believe to be a good one, Mr. Rawlinson in his own evidence, before a committee of the House of Commons said, "It is better to pollute a river than to be a manufacturer of fever." I read those words and thought them very forcible. Well, the Surbiton commissioners did great good in ridding the ditches about Surbiton not of running fresh green sewage, but of stagnant sewage, and they were empowered by their Act of Parliament to convey the sewage into the sewers which run into the river Thames; still they withheld from doing so, until circumstances compelled them to move; they were threatened with an injunction, if they did not put the powers of the Act into force. At last they did so. Having done that, and having incurred under the undoubted powers of their Act, very considerable expense, I apprehend that if any Act of Parliament was to say that it should be undone, the Surbiton commissioners would have good grounds for compensation for any cost they had incurred. I would add a few words more, that I have been most eager to avoid committing any nuisance, and nobody has been more eager than I to take up the question of the purification of the Thames. With that view, I entered into a computation of how an intercepting sewer might be made to continue the sewer belonging to the Lambeth Waterworks Company, through Kingston, by Ham and Richmond, to join the Metropolitan low-level sewer at its upper point at Putney. I went into a calculation of the expense, and I laid a scheme before the Board of Trade. I was convinced that the work might be done by a rate of a penny in the pound spread over the property, which would be benefited by it on its present value, extending over 40 years. The scheme was so far favorably received by the Board of Trade, that they did me the favor to communicate with the chairman of the Metropolitan Board of Works with the view of inducing him to allow us to enter their sewer. The answer received was unfavorable, for he positively refused to allow any Surbiton sewage matter to be introduced into that sewer, which he alleged was not constructed for that purpose. My project therefore failed, but I believe it to be perfectly easy to construct such an intercepting sewer at a very trifling cost. I mention this to prove, in answer to the chairman's question, whether I think we should at Surbiton be exempt from any legal interference, that we have no wish to shrink from the thing, or to shelter ourselves under our Act of Parliament, and that we have been most forward in endeavouring to find a remedy, and I may say more forward than other places.

5858. The health of the population is the first great consideration, and the purification of the rivers is the second consideration ?—Just so, but as it appears by your instructions that your attention is to be directed to the possibility of using other means besides the river, I wish to make one observation as to the particular locality in which we live, and the possibility of application of sewage to the land. I have not been to Croydon, where sewage is applied to the land, but I have recently visited the works at Carlisle; I saw them at work; I paid great attention, and was greatly impressed with their success. The sewage at Carlisle is thrown upon the land, and it disappears almost instantly, quicker than you can conceive, for as I stood there talking to the workmen, it melted away through the land. If those operations at Carlisle, successful as I believe they are, and highly so, were to be quoted as an authority for saying that the same thing was possible to be done elsewhere, I think there would be great misconception. Upon the stiff clay soil of the London basin, of which Surbiton hill consists, the result would be very different; in fact, before our drainage works were commenced, a great deal of the sewage of Surbiton hill actually did throw itself upon the land, upon a grass field, and it was the excessive nuisance that arose from that spot that forced us into action. The sewage lay upon the land, the grass grew strongly and rankly no doubt, but I do not believe that a cow would have eaten it. The farmers complained that their land was destroyed, and the smell was most dreadfully offensive to those passing by. Then near Kingston and Surbiton there is hardly any figure that you can put upon an acre of land which the owners do not think too small, they consider that for three or four miles round all the land is of this valuable quality for building purposes. I wish to impress upon you this difficulty, for it accounts for our peculiar position, for first of all a man, believing that he can get from 500*l.* to 1,000*l.* an acre for his land, is not likely to grant us a lease of it to make a sewage farm. In the next place, if under compulsory powers we obtained it, I do not think that I could obtain 2½ acres of land in Surbiton, and what would that be to 260, which were required, as you remember, for Croydon ? The thing, therefore, is quite out of the question. But, supposing that it could be done, the adjoining owners, if any of us attempted to throw sewage upon the land, would be sure to get an injunction from the Court of Chancery, on the ground that our work would destroy their frontage land for all contemplated buildings. These are the difficulties that present themselves in growing neighbourhoods, and Surbiton is a place that has grown considerably, and it is still a growing place, though not so fast as before. I believe that finding land for the purpose of making a sewage farm anywhere Surbiton way would be almost out of the question. I have heard that some land has been suggested near Richmond park; whether that could be made available, or whether the owner would consent to it or not, I give no opinion.

5859. Supposing that Parliamentary powers were granted to the Conservators of the Thames to take the sewage away from Surbiton altogether, levying certain rates which should not be excessive, say not more than a penny in the pound, do you think the commissioners, with whom you act, would come into such an arrangement ?—My answer is, speaking for myself as chairman, and I believe knowing the opinions of my brother commissioners, that we should readily concur in any proposition for a scheme which at a rate of a penny in the pound would remove that which is thought to be so great a blemish as the fouling of the river Thames.

5860. (*Professor Way.*) Might not the sewage of Kingston and Surbiton be utilized together, outside the boundary of either parish, Surbiton contributing its quota to the expense incurred for both places ?—If you were to join together a large number of populous places like Richmond and Ham and Wimbledon besides, I fully agreewith what you say, but it is all a matter of cost.

5861. Such a scheme would not necessitate an ultimate outfall into the main drainage system of London? —Not if it could be done by utilization.

5862. In the case of towns situated on the river Thames, it is not conclusive to say that any individual town has not area of land sufficient to put its sewage

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upon if it could combine with other towns for the purpose?—I think not, and I would gladly welcome any proposition for the combination of several towns, which would bring about so important a result, if it did not break the back of the district.

5863. (*Mr. Harrison.*) Would you be good enough to read to the Commissioners your estimate of the expense for an outfall sewer from Surbiton to Putney?—Yes. I took roughly 3 miles of river frontage because I considered that all such land was, or was likely to be, valuable building land. Supposing the proprietors of this property pay a penny rate, with that penny rate I believe such an intercepting sewer could be constructed.

5864. Had the Metropolitan Board acceded to your proposition and allowed the sewage of Surbiton, Kingston, Richmond and Ham, to be carried into their sewer, that sewage would have been carried to the termination of their low level sewer, and must have been pumped up by them before it could be discharged?—Yes.

5865. That pumping would have been an expense?—No doubt.

5865*a*. Did you contemplate having to pay for that pumping?—Yes, I did, and that was the very first point raised by Mr. Bazalgette. He said "You expect us to provide for your pumping" I said "Certainly not." I thought that we ought to contribute a reasonable proportion, but I could not get from him anything like what the cost would be.

5866. In addition to the penny rate for the construction of an intercepting sewer to be carried to some point where the sewage could be utilized, you would be willing to be subjected to a further rate for pumping it on to the land?—I conceive that that would be necessary, at the same time I wish to add that my opinion upon the matter is, that it should be a landlord's tax and not a tenant's tax.

5867. It has been stated in evidence by one gentleman that there is a considerable portion of land lying between Kingston and Ham which might be obtained at not a very high rate that would be proper and sufficient to utilize the sewage of this district upon?—If it is the land that I suppose it to be, what we call Lord Liverpool's farm, I should be greatly surprised to find that it was obtainable. If I was the owner of five acres of that farm you should not put a drop of sewage on to it. However I can point out a site where, if things came to an extremity, I should wish to go, I mean that great wretched waste called Ditton Marsh lying towards Esher. There is a great bare waste of needy land which I believe might be greatly improved by sewage, and I think sewage could be laid there without causing a nuisance to anybody; that is the only place I can think of.

5868. (*Chairman.*) But it would be quite impracticable for you, as a separate township to go there?—Quite so, it would ruin us.

5869. Combined action might take the sewage there?—Yes.

5870. Is Ditton Marsh likely to be built upon?—No, it is an unenclosed common land, and I suppose it yields no value to anybody, except for the grazing of donkeys.

5871. (*Professor Way.*) Is it ever flooded?—No, I think not, it is a piece of nasty low common land partly covered with furze and rushes, there are about as I understand 300 acres.

5872. Who is the lord of the manor there?—I suppose it is Captain Speer, of Thames Ditton.

5873. Then you would have the rights of the lord of the manor and the common rights to get rid of by Act of Parliament?—Clearly.

5874-5. (*Mr. Harrison.*) Is the land on the other side of the Mole building land?—All this part (*pointing to a map*) on the banks of the Mole at present produces large hay crops; round about East Moulsey a little to the west of Moulsey they use the land for building; but there is a large tract here (*pointing to a map*) which is not in any way tapped for building purposes, it lies very flat, and round by the Mole is liable to be flooded. There is no road of entrance into it, but at the present time it produces large hay crops.

The witness withdrew.

T. C. Hansard, Esq.

THOMAS CURSON HANSARD, Esq., further examined.

5876. (*Mr. Harrison.*) You have heard what Mr. Walpole stated just now as to the large extent of land below Kingston that you thought was suitable for the application of sewage?—Yes.

5877. Do you think he was right in his opinion that it was not obtainable for the purpose?—I cannot tell what the feeling of the proprietors may be, but my opinion is that the interior of that basin cannot be built upon for a great many years inasmuch, as although it may be building land, certainly the exterior, the higher ground towards the river, affords much more eligible sites, which will be built upon first; the interior therefore might serve the purpose of sewage application for many years to come.

5878. Did you remark the observation made by Mr. Walpole as to the liability there would be to an injunction from persons proposing to build upon those sites which you admit to be eligible, if the intervening land were applied to a sewage farm?—Yes.

5879. Do you think there is much weight in that argument?—I think there is none. I do not conceive that a proprietor could maintain an action for destroying his view. If indeed the putting of the sewage upon the land caused a nuisance he would have a remedy at common law, but the mere fact that the view from his frontage would be over the sewage farm would be no ground of action either at law or in equity.

5880. Do you know the land called Esher Common?—Yes.

5881. Is that eligible land for the application of the sewage?—I think so, if there is no mechanical difficulty in carrying the sewage upwards; it is a question of pumping.

5882. Is there any objection to the sewage being carried there and applied to the land?—As to that part which immediately adjoins the road from Kingston to Esher I think that such objections as have been mentioned would apply; but to all that which lies upon the left side of the road towards Clayget, the objection does not apply; that is not building land in any sense.

5883. There is a large district between Hampton Wick and Twickenham, is that being built upon?—Yes, it is laid out for building to a considerable extent.

5884. What system of sewerage is proposed for that extensive district?—I am not aware that any system is proposed, but I believe there is a drain being cut across the country which is intended to carry off the sewage.

5885. Is there land at a distance from the river applicable for the utilization of the sewage of that district?—I think it is all beautiful building land.

5866. You think there would be a difficulty in obtaining land?—I think so.

5887. Have you any knowledge of the condition of the river below Teddington weir?—Yes, it is very much fouler than it used to be, unquestionably so. The tide water rising there twice a day brings up a great many impurities which have been deposited at the point of the meeting of the waters, and at the foot of the weir there is a large deposit of very unpleasant matter.

5888. Have you ever found that to be offensive?—At low water the exposed shores are offensive.

5889. You are aware that the inhabitants of Twickenham and Richmond object very much to the condition of the river as it is now?—Yes.

5890. Do you think there is good reason for their doing so?—Yes.

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5891. Have you any observations to offer as to possible remedy for that nuisance?—None ; except a general purification of the river above and below.

5892. You heard Mr. Walpole's evidence as to Teddington lock, and the stopping there of solid matter from above ; do you agree with that ?—Of the insoluble matters which are thrown into the Thames above the lock by the Surbiton and Kingston sewers, that which is of the greatest gravity settles in other deposit basins of the river before it can get to the lock, and the rest is carried down as far as the lock, and there it stops ; very little or none is carried below the lock.

5893. Do you believe that the chief amount of deposit below Teddington weir arises from the sewage cast into the river below that weir ?—Sewage and other matters, together with certain debris.

5894. It is carried backwards and forwards by the tide and deposited in the still water ?—Yes, in the very still water, and in eddies where the tide water meets the stream water.

5895. Are there any other observations you have to offer which you think would be useful to the Commissioners ?—There are some pollutions of the river by dye works, but which are not of great importance.

5896. Where are they situated ?—I am speaking only of one set of dye works that does a certain amount of local mischief. There is also a fouling of the water from loading of refuse from the gasworks, which is sometimes extremely offensive, and which I have recently seen going down the river, and formed by the eddies into floating "Dutch marbling," as I may call it ; I mean the gasworks at Kingston, below the bridge.

5897. (*Professor Way.*) Is that the lime that is used for purifying ?—I think not ; I do not know what it is.

5898. (*Mr. Harrison.*) It is merely carelessness on the part of the loaders ?—Yes, that is all. I wish also to confirm what Johnson, the fisherman, said about the large trout which have been seen dead this year ; seven or eight large dead trout have been picked up, he did not at all exaggerate the size. I have picked up one nearly the size that he named, one that probably weighed seven pounds.

5899. To what do you attribute their death ?—to natural causes, arising in some way from the condition of the river. I cannot tell how they died, but evidently of disease. It is certain that, from whatever cause, there have been more large dead trout picked up this year than has ever been known before.

5900. (*Chairman.*) May it have been from the heat of the summer and the lowness and foulness of the water ?—Yes ; my opinion is that they are destroyed by worms and parasites bred in the foul matter deposited in the river.

5901. Have you ever cut any of the dead fish open ?—I only picked up one ; it had been in somebody else's hands before, and they had taken out the inside. I looked into the mouth, and it was full, apparently, of dead worms or leeches. There is one point which I think comes within your instructions, and to which I wish to draw your attention. The Hog's Mill river here is a very beautiful clear stream, it comes from the chalk ; there are a few small streams which run into the Thames between Hampton Court bridge and Teddington lock ; and they send into the river collectively a very considerable quantity of beautiful clear water, and they aid very materially in keeping the Thames sweet and pure. Some of the ground on the banks of these streams is laid out for building, and in fact the ground will very rapidly be covered with buildings and inhabitants. I think it is therefore necessary that care should be taken of those streams immediately, in order that they may not be in the first place turned into foul sewers, and afterwards have to be cleansed and purified.

5902. (*Mr. Harrison.*) Can you give us the names of them ?—Two of them come through Bushy park and the Home park ; one of them is the Longford river, and the other is a small one lower down, between the railway bridge and the Teddington lock, the name of which I do not know ; this last, if it is to be saved from pollution, must be attended to instantly. There is also a small clear stream at Teddington. One other point is this. I am referring to the Thames Conservancy Act of 1857, by which the bed and soil of the river opposite to property owned by the Crown is reserved to the Crown. If that be so, the whole of the soil of the bed of the river from Hampton Court bridge to Kingston bridge, being opposite to the Home park and Bushy, is vested in the Crown, and not in the Conservators ; that is an extent of 3½ miles.

The witnes withdrew.

Mr. Frederick Gould (of Kingston) examined.

Mr. F. Gould.

5903. (*Chairman.*) Are you a resident in Kingston ?—Yes, and I have been for 25 years.

5904. Are you a member of the corporation ?—Yes, and have been for 15 or 16 years.

5905. Are you engaged in any business ?—Yes, I am a chemist and dentist.

5906. Do you use the Thames much for boating purposes ?—Frequently in the summer. I did last summer.

5907. Is Kingston an increasing district ?—The number of houses has increased in 20 years from 1,300 to 1,600.

5908. Do you, as a member of the corporation, know the condition of the sewerage of Kingston at the present time ?—Yes, I am chairman of the drainage committee that carried out the drainage works here.

5909. (*Mr. Harrison*) Were you chairman of the board when a scheme of sewerage was devised for Kingston some three or four years ago ?—Yes, we had very many meetings of the council, and we advertised for plans, and offered a premium of 100*l*. I believe 17 plans were sent in, and after a consideration of these plans we drew up a report. I have a newspaper here, dated 23rd of August 1862, referring to it.

5910. Have you carried out to completion the system of sewerage as devised at that time ?—Yes.

5911. Are those sewers ventilated upon any principle ?—We have certain air shafts. I remember a discussion on the subject of charcoal boxes, but I believe they were dispensed with. Prior to this our sewers, such as we had, were under the control of the surveyor of highways, and I was chairman of the committee for several years, having the control over about 13 miles of streets, roads, sewers, and drains.

5912. But before you obtained your Act of Parliament had the town used cesspools ?—Yes, there were many cesspools used, and some drains passing directly into the sewers, and thence to the Thames.

5913. Have you now removed all the cespools ?—No.

5914. Do many of them still remain ?—In our affidavit made in the late chancery proceedings we gave every house that was at that time drained, whether by cesspools or by direct drains. Since that time I think we have granted about 57 applications. I mention this because a point has been made as to the great increase of the sewage ; there has been no increased quantity of sewage thrown in.

5915. (*Chairman.*) I believe there are 1345 houses, 685 are drained exclusively by cesspools without overflow drains, and 225 are drained exclusively by cesspools with overflow drains into public sewers, 435 are drained exclusively by drains that run into the Thames, or into the Hog's Mill river, either directly, or by means of public sewers, and you say that in addition, there have been 57 applications for fresh connections ?—Yes.

5916. Have the 57 houses been connected with the sewers ?—That I cannot say, but I know the applications were made and were granted. The Commissioners have received evidence that there has been a great increase in the quantity of the sewage during the last

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summer, but that could not have been, because we have not thrown it in.

5917. Have you paid sufficient attention to the river to be able to say whether it is worse now than it was formerly, or otherwise?—I have not noticed it to be worse, and I have been a bather in it for many years.

5918. Was last summer an unusually dry one?—It was, and the water was lower than usual.

5919. Is there any difference in the river caused by the pumping of the five water companies which take their water out of it?—There is a general impression that the water has been lowered by their operation.

5920. What is your impression upon that point?—I should think it was so.

5921. Do you fish in the river?—Yes.

5922. Do you find it as easy to catch fish as it was formerly?—Certainly. I was very much struck by some remarks that were made by the fisherman Johnson, who was examined here yesterday, because there is a most favorable account of the fishing in the Thames, in the "Comet" of the 2nd and 9th of September, and I have heard nothing but reports of the improved fishing in the Thames and the increase in the quantity of fish. There are some very fine trout being caught here.

5923. Did you hear the evidence that Johnson gave as to the dead trout?—Yes.

5924. Have you seen any of them?—No, I have not, but I have heard of such. I presume that, like other things, trout die from old age, if they are not caught. I believe those that were found were all in good condition and very large trout.

5925. Have you formed any idea as to what is to be done ultimately with the sewage?—Let it run into the Thames as hitherto. I think the conservators ought to be compelled to do what we propose in the interests of public health. They rent of us the towing path, and through that our ancient sewer passes, and we applied to them, our tenants, for permission to lower the mouth of that sewer some 18 inches, so as to deliver the sewage at a point a little lower down, and also, in the interest of the public health, to carry the sewage out into the river 30 feet by an iron pipe, and so deliver it into the bed of the river in a rapid stream. The conservancy refused that. The sewage now pours out on the edge of the bank, and floats away causing some deposit, whereas by the plan proposed by us, that would have been avoided.

5926. (*Mr. Harrison.*) Do you know how far the Thames Ditton sewer, of which Mr. Walpole spoke, is carried into the river?—I have seen it, and it is some feet.

5927. It is not carried out into the deep water, is it?—No, nor is the stream there rapid. It is divided by an island, and the current is on the Middlesex side, while the more sluggish water is on the Surrey side. But where our sewer pours in, it is a rapid stream and we should, if we had been allowed, have delivered the sewage directly into it.

5928. Are you aware that the conservators also took steps to prevent the Ham Common people from passing sewage into the Thames?—I understood so, but the people at Ham Common say that they only pour in surface water from the roads.

5929. They have also expended for that small place upwards of 3,000*l.* in sewerage?—Yes, but they never had had a previous system. I heard it stated in evidence yesterday, that we had previously no system, and that it was a ditch and not a sewer which passed down the back water. In answer to that, I can state that it was the main outfall in the London road. I have walked along the sewer, we have taken out of it many cart loads of silt, and it is of very ancient construction. I hold in my hand a copy of the resolution that was passed with respect to advertizing for plans and specifications, and it contains these words, "The "system of drainage to blend as far as practicable "with the existing drains, the plans and description "of which are at the Town Clerk's office." That I think proves that there was a system before, and there was an outfall sewer to it.

5930. I suppose that is the condition of every village and town on the banks of the Thames, that from time immemorial, or as long as there have been houses, a certain amount of refuse has passed away into the watercourse?—Yes.

5931. And the Thames as the natural valley line must receive all that flows from the surface or the subsoil in its vicinity?—Yes; yesterday the diminution in the quantity of fish was said partly to result from the deposit of sewage upon the spawn and upon the weeds. I think if Johnson had been asked the question you would have found that he took the specimen of sewage that he brought here about 80 yards below the mouth of our sewer on the bank. Now that is not where the fish deposit their spawn; they deposit it on the hills, that is, on the shallow parts, and there the sewage in the condition of that which he produced does not reach. The limit of that flocculent deposit is just immediately adjoining the sewer which discharges itself near the surface. The matter floats away and is caught by the weeds, and there accumulates, and it is seen along the edge not for a very great distance down there, I believe, but only on that margin, not passing out into the stream. All that would have been prevented if the proposal we made and wish to carry out still, had been consented to,—that of delivering the sewage 30 feet from the bank into the bed of the river, where it would instantly be intermingled with the stream; the only cost would have been an iron pipe. It would not have interfered with the navigation and it was part of our contract that it should not. But I say the sewage is not diminishing the fish in the river by destroying the spawn or smothering it, and this was the evidence of Mr. Nelson in his affidavit. "The quantity of fish in the "river has rapidly increased during the last two years "in consequence of the employment by the Thames "Angling Preservation Society of bailiffs to prevent "poaching."

5932. (*Professor Way.*) You contend that the quantity of fish has increased in the river in consequence of the sewage, and not in spite of the sewage?—Partly in consequence of the sewage, because they have been fed. I believe that sewage is food for fish, and that many fish live upon it. The natural ratio of increase in the fish has gone on whilst the destruction of them has been diminished by the action of the bailiffs watching on the Thames, and preventing poaching.

5933. Did you hear the proposition of Mr. Walpole, which was to make an intercepting sewer along the banks of the Thames for Kingston and other places?—Yes.

5934. What do you think of that?—I will just read to you a short extract from a speech that I made on the 23rd August 1861. I remarked on the tendency of legislation towards purifying the Thames, and I said, "In a few years the towns on its banks might "be compelled, instead of pouring their sewage into "it, to contribute to the cost of constructing an inter-"cepting sewer parallel to it which would convey the "sewage to the outfall in the direction of Barking "Creek. Under the first system, after having expended "a large sum for imperfect drainage, the town would "have to contribute to this intercepting sewer, while, "under the last, they would not, as no sewage would "go into the Thames. And the intercepting sewer "might be availed of for carrying away the liquid "drainage, or it might not, if the plan was found to "work well."

5935. You think that if the government takes steps to put all parties inhabiting the banks of the river on the same footing, it would be only reasonable, if some feasible scheme could be devised, the cost of which might fairly be met by local taxation, that you should be compelled to come into it?—Yes, so that our interests were represented.

5936. And that you derived a benefit from your

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expenditure ?—Yes ; if we had a vote as to the expenditure.

5937. You think in Kingston that if the Conservancy Board is to be extended over the whole area of the river the Borough should at least have a vote, or be represented upon that Conservancy board ?—Yes ; there should be fair and proper representation, all places interested should be taxed, and taxation should be accompanied by representation.

5938. That would be the case with Windsor, Oxford, Reading, and all other places ?—Doubtless.

5939. You do not wish, I presume, to advance this proposition that the Thames is the proper receptacle for the sewage of towns ?—Certainly ; I would maintain that it is until something better is provided, and meantime the towns are powerless. The very sites proposed for the utilization of the sewage are not in our borough.

5940. If the Vice Chancellor had declared that you should not discharge your sewage into the Thames, you would have remained helpless ?—Yes ; having accompanied a deputation to various towns in England to inspect the different systems of sewage utilization in operation, I had come to the conclusion that there was no system known by which it could be profitably manufactured and utilized ; that only in rare cases with peculiar local advantages could it be utilized profitably upon the land.

5941. What places did you visit ?—I went to Leicester.

5942. What other towns did you visit ?—Croydon and Cambridge.

5943. How long is it since you were at Croydon ?—Some years since.

5944. You have not seen Croydon since Mr. Marridge commenced his farming operations ?—No ; a question was asked what we should have done in the event of the Vice Chancellor having given an adverse decision. I should have suggested the plan that I saw at Ely, and which was accidentally discovered there. At Ely the sewage was raised, and conveyed to the surface of the ground near the river. Some large intercepting tanks were constructed and hydraulic apparatus to raise the sewage. The engineer stated to me that the sewage used to come down there hot and whole so rapidly by the small drain system that he had a cage made which intercepted it, and it was lifted frequently during the day. He constructed some sheds and other works in order to make an artificial manure manufactory there. One day the militia wantonly set fire to the place and burned down the sheds, and the place was ruined. The man was not disposed to renew the works, and expected there would shortly be a stoppage in the flow of the sewage, but to his astonishment it went on month after month. I think at the time when I saw it, it had been going on for a year or two without any emptying of the tank, the water had continued flowing, only slightly colored, in to the river adjoining, by a syphon, just where the fishing was most frequently carried on. We had the place opened and to our surprise found remaining in the tank, instead of many hundred tons of solid matter that must have gone in there, only a small quantity of ashy looking clayey carbonated paper. It appeared that whilst the sewage liquid had percolated upwards through the filtering material, straw or charcoal, the solid matter must have been kept under pressure sufficiently long for the process of maceration to be completed, and the quantity each day thus dissolved must have been about equal to the quantity that came in.

5945. If a clause were introduced into an Act of Parliament saying that the effluent water passed into the Thames should not be more impure than the Thames itself, the process of maceration would not help you much ?—No, but I see the whole tendency of the evidence here has been, and I find it the general view, that the difficulty is in dealing with the undissolved matter—the solid matter of the sewage. I believe that where the solid matter is converted into a soluble condition, it passes away and fertilizes plants as it does upon the irrigating plan, you get rid of the objectionable gases and the objectionable matter of the sewage by plants taking it up.

5946. Have you anything further to add as to the land suitable for the application of the sewage ?—Some observations have been made with regard to clay. I entertain doubts as to its percolating power, and that is a very material point. A greater surface would be exposed to decomposing action in a porous soil than in a clayey one, and the site mentioned by the gentleman previously examined, the Ham Fields site, would be clay, and in case of a clay soil I suppose that a larger area would be needed. However, another site was mentioned, some common land belonging to the Earl of Dysart, but I believe that the greatest possible obstacle would be raised to obtaining it, both by Earl Dysart and by the owner of the property adjoining, Mr. Byam Martin. Again, Lord Liverpool's land is building land, and would be of considerable value. Building is tending in that direction very much. I have heard Ditton Marsh spoken of, it lies low, and is in some measure under water, and of course it would be a question of engineering to effect the drainage of it, so as to use it for the intended purpose, but we should then be conveying our sewage back again, having first carried it down hill. But there is some land here (*pointing to the map*), which is I think more suitable than that ; it is called the Marsh, it is a quantity of land that stretches away from the mill stream here along the bank of the Malden river towards Malden, it is bounded by the railway, and there are now no houses there. It is land perhaps of less value, and less likely to be built upon than any we have in the neighbourhood. If the plan were adopted of applying the sewage to the land, that seems to me to be the most likely site we have, but I cannot help thinking that the plan of an intercepting sewer as suggested would be the best, because that would deal with the sewage of other towns besides our own.

5947. Have you seen advertisements in the papers lately of an intended application to Parliament by a company to utilize the sewage of Kingston amongst other places ?—I have heard that such a bill is to be applied for.

5948. (*To Mr. Wilkinson.*) I suppose if a Company should obtain parliamentary powers, and should wish to treat with you, for the purpose of taking a nuisance away from you, you will be ready to treat with them ?—Yes, but I do not know at present on what terms the plan would be proposed.

5949. (*Mr. Harrison.*) Do you know where the land is situated where they proposed to utilize your sewage ?—It is on the other side of Tolworth, just below Surbiton.

5950. That is upon the clay ?—Yes.

5951. (*Professor Way.*) I should wish to know whether you treat as not solid matter that other matter which is so highly divided that it really remains suspended in the liquid ?—There is a difference clearly between solution and suspension. The salts are in solution, but there is a certain quantity of matter in a very minutely divided state in suspension.

5952. Are you aware that all attempts to filter sewage without chemical treatment, or even with chemical treatment, have entirely failed, from the extreme tenacity of the particles in suspension, which are afterwards deposited when they come to rest ?—Yes, I did not suggest the plan as a means of absolute purification, but as an alteration of form. I contended that sewage passing into the river in that form is less offensive than passing in without such treatment.

5953. Do you think that in the act of passing through those openings, a large quantity of solid matter was converted into soluble matter ?—Yes.

5954. (*Mr. Harrison.*) Do you not mean in a comminuted state rather than in a solid state ?—Partly in a soluble form, because it would pass through paper or other filters that might be used, and therefore was in as perfect a state of solution as salts could be.

5955. (*Professor Way.*) If you take a bottle of

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sewage and ascertain by filtration how much solid undissolved matter it contains, and keep that for six months, and try the same experiment, will you find any difference between the two qualities?—As to that which would pass through a filter, I think I have experiments that would show there is a diminution.

5956. The point in your argument depends upon whether the water going away does contain less matter in suspension?—Yes.

5957. Do you know the land in the neighbourhood of Tolworth?—Yes.

5958. Is that likely to become building land?—It is building land, and building land all round it: every place here is increasing so much in value. Of course the value of the houses and property adjoining would be materially injured by the arrangements necessary for a sewage farm.

5959. You agree with Mr. Walpole upon that point?—I think there can be no doubt of it. I have houses of my own to let here, and there is a mill-dam some 100 yards distant; and really the questions that are asked about it as to whether there is anything objectionable are almost perplexing, and I am sure that the questions would be such that one would find great difficulty in letting a house except at a very reduced rental if it adjoined a sewage farm.

5960. It appears tolerably clear that the question of the application of the sewage at Kingston in some way or other is urgent?—No doubt of it, and it is increasingly so.

5961. (*Chairman.*) You agree with Mr. Walpole as to the comparative innocuous effect of the sewage sent into the river from Surbiton in a large quantity, but far into the river, as compared with the sewage of Kingston which is discharged close to the edge of the river?—Decidedly; but as to the promenade, I never noticed any offensive smell there, nor have I heard of any. We have persons here who are very ready to make complaints if nuisances exist; that promenade is frequented by ladies and gentlemen with their children, and I have not heard of or noticed any deposit, or any complaint of it. I cannot say that I have not, in a hot summer's evening, noticed anywhere any smell. I have seen flocculent matter floating on the stream as described by Johnson the other day.

The witness withdrew.

Mr. W. Mercer.

Mr. William Mercer (of Kingston) examined.

5962. (*Chairman.*) What are you?—I have retired for about 20 years, from a mill.

5963. Are you an inhabitant of Kingston?—Yes, I have been here for 50 years nearly.

5964. Will you state what are the points you wish to speak to?—I wished to suggest to you whether it would not be well to carry on the waterworks sewer down by the side of the Thames, in connection with Surbiton and other parishes, into the Government sewer, somewhere about below Wandsworth. This seems to be much better than having it conveyed over lands in the neighbourhood which are very valuable. I think that would be very objectionable indeed.

5965. Are there any other points that you wish to mention to the Commission?—No other, except that I think we, as a town, ought to contribute fairly towards such a plan in conjunction with others.

The witness withdrew.

Mr. C. Miles.

Mr. Charles Miles (of Hampton Wick) examined.

5966. (*Chairman.*) What are you?—I am a member of the local board of Hampton Wick.

5967. What is the population of Hampton Wick?—About 2,200.

5968. Is Hampton Wick sewered?—It is.

5969. Where does the sewage go?—It drains into the Thames, just below the bridge, about 20 yards below.

5970. Is it a new sewer or an old one?—An old one; there are two, one from the Crown preserves, and one from the village of Hampton Wick.

5971. Are there any cesspools in Hampton Wick?—It is chiefly drained by cesspools.

5972. The contents of the sewers are the overflow of the cesspools?—Yes, the surface water.

5973. How is Hampton Wick supplied with water?—From wells, and from the Grand Junction Water Company.

5974. Are the wells sunk into the same ground as the cesspools?—Yes, at certain distances.

5975. Did you ever hear of complaints as to the contamination of the water?—Generally the well water is very good, far better than the water supplied by the company.

5976. (*Mr. Harrison*) Have you heard any complaints made?—Yes, in one or two instances, but from what cause has not been ascertained. It will often occur, even within very short distances, that one well is very pure and good, and the other not so.

5977. (*Chairman.*) Is the Thames, in your opinion, better or worse than it was when you first knew it?—I have known it for 35 years, and I cannot say that I have seen anything bordering upon a nuisance. However, I find in most instances that local bodies that drain into the Thames are compelled to empty their sewage just on the margin of the river, and oftentimes this creates a deposit there, which in hot weather is very offensive; but I think that if the Conservators would permit the local bodies to carry their drainage into the centre of the stream, much, if not all, of this drainage would be entirely abated; the different eddies would cease that are caused now by the deposit that is left there, and, of course, there is a nuisance created by that.

5978. If the Thames conservators, instead of allowing you to carry the sewage into the centre of the river, afforded you means to keep it out of the river, would your board fall into a scheme of that sort?—That I cannot say; we are all doing all that we can to get rid of our sewage better. We are now in communication with the Board of Works to be permitted to carry part of our drainage into their system of sewers through the Home park. That drainage still empties itself into the Thames.

5879. Supposing the government say that no sewage shall go direct into the Thames, I suppose your board would then fall into any scheme that might be devised to remove it to some other place?—We would only be too glad to have an opportunity to do so, provided we were not put to too great an expense.

5980. What are your present rates?—Our present rates are about 3*s.* 6*d.* in the pound, including everything.

5981. What is the poor's rate?—2*s.*

5982. Your rates for the local board are 1*s.* 6*d.*?—About that.

5983. That includes the highway rate?—Yes, the lighting rate, and the water rate too; we water the roads.

5984. And the scavenging?—Yes.

5985. Do you know what it costs to empty a cesspool?—That depends very much upon the size of it; it averages from perhaps 1*l.* to 30*s.*

5986. How often are the cesspools emptied?—The large ones of course do not require to be emptied often; some have overflows from the cesspool to the drain, and where you have an overflow of course the cesspool takes a longer time to fill with deposit than if you have no overflow.

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5987. What is done with the material that is emptied out of a cesspool?—It is generally used for gardens or agricultural purposes. I know many persons who use it entirely for their own gardens.

5988. (*Mr. Harrison.*) Is there much water that overflows?—No.

5989. It is chiefly absorbed?—Yes.

5990. (*Chairman.*) Have you anything further to add?—I would strongly advise or impress upon any authority a necessary precaution; a number of small streams that run into the Thames now in my opinion act as purifiers to the large stream, and they counteract to a certain extent the amount of sewage that may run in to the large stream. There is another thing that should not be lost sight of. We perceive how necessary it is for water companies to cleanse and make filtering beds to purify their own water, and I find myself, and I know as a fact, that the more you can dredge the Thames and the more you ballast it the more you remove the deposit that is oftentimes placed there by the sewage. If, therefore, you make the bed of the Thames again clear, it will become what I should term nearly a pure filtering bed again.

5991. (*Mr. Harrison.*) Do you think that the liquid takes a dive into the gravel and comes out again pure?—Not so far as that. I think this, that when the sewage is emptied into the Thames it floats down to a certain extent, and you find then that the turbid nature of it is entirely lost, the solid matter having settled at the bottom of the river. But by the continued dredging or ballasting of it, you remove it from the bed of the Thames and make a filtering bed of the Thames to receive the next deposit that may come down. Much has been said about the diminution in some places of the fish. For many years I have seen very large trout taken out of this part of the Thames weighing frequently 12lbs. and 14lbs. each, but I believe that of late years there have not been many of that size. Still I find that wherever you have a sewer running into the Thames you will find there are always plenty of fish, and a great number of sportsmen all round the mouth of the sewer. There is always a large amount of food, I dare say, coming down the Thames that these fish seem to be very fond of. I have gone to the sewer at Surbiton many times, and I have seen the water myself there quite black with fish round the mouth of the sewer. I believe sewage is not detrimental to the health of the fish or the growth of them, or their number.

5992. (*To Mr. Gould.*) What is the condition of the Hog's Mill river in summer?—It is drained back by several mills; they keep a head on.

5993. Is it a tolerably good stream?—It is a very nice stream; it is in fact the Ewell river, and it passes through my ground.

5994. (*Chairman.*) In passing through Kingston to Surbiton you cross that river, do you not?—Yes.

5995. You go through it?—Yes, for about a third of a mile; it is a very nice trout stream, and I am very anxious to keep the tributaries of the Thames pure.

The witness withdrew.

Adjourned till Tuesday, December 19, 1865.

Richmond, Tuesday, 19th December 1865.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

WILLIAM CHAPMAN, Esq. (of Richmond), examined,

RICHMOND.

W. Chapman, Esq.

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5996. (*Chairman.*) How long have you resided in Richmond?—I may say all my life.

5997. You are clerk to the magistrates?—Yes.

5998. You know the River Thames?—I do.

5999. Will you be good enough to state the heads upon which you wish to give evidence?—There are two heads of subjects into which you are directed to inquire; first, as to locks, weirs, and mills, as affecting the drainage of towns and villages, and the adjacent lands. The other point relates to the discharge of sewage from towns and villages, and I think it will perhaps be more necessary to take the second head, rather than the first, because we have no mills, weirs, nor locks in Richmond, nor do I think that the river in any way affects—at all events detrimentally—the drainage of towns and villages and adjacent lands. The condition of the river itself as affected by the discharge of the sewage from towns and villages and adjacent lands is becoming a matter of very serious importance, and every year seems to render that importance more pressing. Formerly there was not so much drainage into the river from any town; there were more cesspools and fewer drains; but recent improvements in drainage have compelled the turning of a great amount of sewage into the Thames both from Richmond and from places above and below; but I am not inclined to think that the sewage generated in our town would much affect the sanitary condition of the Thames. What we have most reason to complain of is that which is brought to us from London; ever since the removal of old London Bridge the tides have been gradually increasing in intensity upwards, owing, I assume, to greater facilities being given to the water both flowing and ebbing. The consequence is that tides come up with great rapidity and attain greater heights, and then fall with equal rapidity, so that for nearly nine hours, upon the average, out of the 12 we are left simply to the operation of a very diminished stream. It is difficult perhaps altogether to give a reason that will account for the diminution of the stream, but the experience of anybody of my own age, or even of less, I may say 30 years, must convince them that at ordinary low tides we have much less water in the river than we used to have, and one consequence is that the surface of the bed of the river is very much exposed, so much so that in a dry summer, such as the last, and such as it has been for several summers previously, including the year 1859, a person might have walked over the Thames with very little difficulty at low water. One way of accounting for that, although I know it has been disputed, is the immense body of water that is taken from the Thames by the several water companies for the supply of London, and whatever the amount of that may be, I think it is sufficient to have a marked influence upon the quantity of water that now comes down to Richmond. The diminished quantity of water coming down operates less against the ascent of the tidal wave from London; but it is to that tidal wave that I attribute the greater part of the mischief we have now to deplore. During the last summer owing to the long and continued drought, there was very little water sent down from the upper country, and the consequence has been that the river,

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being nearly dry at low water, has been supplied on the rising of the tide with an immense body of what I can only call "slush," sent up from London. It is water, not so much impregnated, but loaded with sewage and all other deleterious matters. It reaches its height at Richmond, and for a time, just at the turn of the tide, it is comparatively still; then, of course, it begins to deposit what it holds in suspension, and in consequence of this we have found at low water that there has been a large accumulation of the most filthy mud, and when that has been operated upon by a hot sun, it has rendered it almost impossible to walk, with any degree of comfort, by the banks of the river. That has been the state of things during the whole of the past summer, and we have every reason to fear its continuance in future summers. From the increase of London and the population round about it who must necessarily use the water from the Thames, a far larger abstraction of water must be made from the upper districts of the Thames than is required even now. Our own sewers debouch into the Thames, including some that come from Petersham, and there is a very offensive drain just by the Duke of Buccleuch's house, which marks the extremity of Richmond parish. Beyond that the parish of Petersham commences. Then all along the banks of the river downwards, as far as the railway bridge there is a succession of drains, and at the railway bridge a very large outfall in point of quantity—there is a large sewer there which discharges its filth into the Thames. Although I am not prepared to say that alone would have created the nuisance of which we complain, yet we must be aware that this and the sewage of other large towns above us must necessarily contribute at the present day to do a certain amount of injury, and we are justified in fearing an increased amount in every succeeding year. At high water I hardly need say that all the outlets of these sewers are covered, and the volume, provided it was pure water, would so far dilute any sewage from Richmond as probably to render it innocuous; but the advent of sewage from the lower district it is impossible for us to deal with, except by providing an increased body of water that shall have force sufficient to meet the tidal wave, or by keeping permanently a large body of water here, which would suffice to dissolve any amount of sewage that we ourselves might send into the Thames, and to hold back for the greater part of a tide any access of water from London. This leads me to the suggestion of what has now become a very important matter in Richmond, I mean the necessity for a lock in some portion of the river below Richmond, which shall hold up the water and so prevent the exposure of those mud-banks which we now find so offensive. There is nothing peculiar in the sewage of Richmond; we have no manufactures that in any way affect it; it is simply the ordinary sewage of a large town. There is a question as to the possibility of intercepting and rendering useful or innocuous our own sewage; that subject has been often thought of, but we find that there are great difficulties; we must get rid of it. The only question left for us to consider is how to intercept it and get rid of it altogether. Now as, of course, Richmond-upon-the-Thames must stand higher than Putney-upon-the-Thames, and as the main sewer of the metropolis is brought to Putney, it appears to me that we shall be ultimately driven to take our sewage into the metropolitan sewer.

6000. Are you acquainted with a memorial, a printed copy of which I hold in my hand?—Yes, I have seen it; and, in fact, I was one of a deputation that waited on the Conservators of the Thames upon the matter.

6001. That memorial, I believe, contemplates the making of a new reach by erecting a weir and a lock, as suggested?—Yes, it does.

6002. Have you considerede th probable effects in the event of Richmond and all the adjoining places using such reach as a place of deposit for sewage?—To a certain extent sewage might cause anaccumulation.

6003. You speak of the dilution of a large body of sewage matter, but if there is something that would not be diluted it would go on accumulating?—Yes, that which is held in suspension.

6004. Sand and grit from the roads, such as you have been cleansing within this day or so out of your street gullies?—Yes, I dare say there is a great deal of that sort of solid deposit.

6005. It is difficult to say what would become of that, but we may expect that there would be near the weir proposed to be constructed a deposit of that kind of matter?—Yes.

6006. You say that tidal water comes up much stronger than it did formerly, and that this has occurred since the demolition of old London Bridge?—Yes.

6007. Do tidal waters come up as foul now as they did before the great intercepting sewers were completed, or are you aware that they are partially in use on both sides of the Thames?—I was not aware that they were in use on both sides.

6008. Do you think the foul water was the sewage from London, or that it was the foul deposit of the bed of the Thames, stirred up by the up-flowing tidal water?—I am inclined to think it was sewage from London, for at that time we had very little water indeed coming down the river, and what did come down was comparatively clear.

6009. But there might be a great deposit of mud, the accumulation of many previous years?—Yes, unfortunately there is a great deal of mud in the river, forming filthy banks. I recollect, about six weeks or two months ago, that it was with the greatest difficulty I could land from the ferry-boat, owing to an accumulation of the mud. I had to walk half across the river to get into the boat, and when I was landed at the ferry it was as much as the man could do to place his boat where I could get a safe foothold; the rest was all mud of the worst description. It was very low water, but I have repeatedly observed that the moment the tide has turned to flow upwards the mud has come up in clouds of thick dark matter.

6010. I suppose you know the law of in-flowing tidal water, and that it would not necessarily be the actual water from London but the water of the river forced on by the tidal water coming from the mouth of the Thames, pushing up the intermediate water, and that stirs up the foul deposit; you do not necessarily get the actual water or the veritable mud from the metropolis, but the motion to stir up the mud in the bed of the river?—Not necessarily; but we have scarcely any water between us and London at the time of low water. I am compelled, therefore, to infer that the water does come from London; it may perhaps come from some intermediate point, but if so, the mud has been deposited there before by the tidal wave from London, and it comes up gradually; for instance, it will be deposited at Battersea to-day, and part of it will be taken on to Wandsworth to-morrow, and so on to Barnes, Mortlake, Kew, and Richmond. It is gradually brought up.

6011. You admit that Richmond passes its sewage into the Thames?—I am sorry to say it does.

6012. Undiluted?—Yes.

6013. Whether it be much or little, it adds its quota to the existing pollution?—Yes.

6014. Do you think you could fairly call upon other places either above or below to incur any expense to keep the Thames clean, and not include Richmond?—Certainly not. I think it would be most unreasonable to expect others to do that which we were not willing to do.

6015. You think you must all come into some joint plan?—I hope so.

6016. At the present time the conservators take no action, but you are aware that they have legal power over this part of the Thames?—Yes.

6017. Do they do nothing in the way of embanking or dredging, or cleansing, or purifying the river opposite Richmond?—I cannot say that I know anything about it, but I believe there is some dredging occa-

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sionally going on or ballasting; but I do not know of any attempt at cleansing.

6018. Do you know what the system of sewerage in Richmond is, by whom it was devised, and how long it has been in action?—We have some old drains which have been in action for a very considerable time; the more modern ones, I think, were laid down by the Commissioners of Sewers. For a long time we had been out of any commission of sewers; all of a sudden they put us under the Metropolitan Commissioner of of Sewers, and they kept us in so long as to abstract a very large sum of money from the parish, and without doing, as the parish considered, any very great benefit. Then that commission was superseded when the Metropolitan Government Act was passed. When the old commission was abolished we were left without any Metropolitan authority for constructing sewers.

6019. How far did that system of sewers extend up the river?—It included Richmond. They have not done anything in Petersham, whether they have powers or not I do not know.

6020. How is Richmond governed now?—By a vestry.

6021. You have not adopted the Local Government Act?—No.

6022. Have you a body of commissioners?—They are called vestrymen. The Act was passed in the 25th year of George the Third.

6023. Do you know what the population of Richmond is?—At the last census it was 10,921.

6023. Do you consider Richmond an increasing place?—Yes; and I should think it would be right to put down an increase of about 2,000 to the census return, making the present population about 13,000.

6024. What is your rateable value?—The net rateable value is about 72,596*l.*

6026. Has there been any memorial from Richmond to the Metropolitan board to be allowed to convey your sewage into their main sewer?—I am not aware of any deputation having gone to them. I have expressed my own opinion on the subject, but I am not certain that that is the general opinion of my colleagues in the vestry.

6027. Do you know how the present Thames Conservancy Board is constituted?—Not with accuracy. I believe there are certain commissioners nominated by Government, and some by the city of London.

6028. Do you know the condition of the property on the opposite shore up as far as Teddington lock and Twickenham, and what becomes of their sewage?—I am not competent to speak as to that.

6029. What water supply have you for Richmond?—The water is supplied by the Southwark and Vauxhall company; their mains pass through Richmond.

6030. It is Thames water?—Yes.

6031. Do any of the houses in Richmond still use cesspools?—I think they do. I have no doubt of it, some of the older houses.

6032. I observed this morning that there has been some recent cleansing of the gullies. I suppose that is done by the servants of the parish?—Yes.

6033. Have you a surveyor?—Yes.

6034. Have you an inspector of nuisances?—He is the same person.

6035. Have you a medical officer?—We have no medical officer of the parish, but there is one attached to the Union who takes the district of Richmond and two other parishes, Dr. Maybury, who will give evidence.

6036. Do you know anything of the proceedings in connexion with the memorial in favour of constructing a new weir and lock below Richmond?—Yes. I was one who waited upon the Conservancy Board by appointment; they listened to us very attentively, and they promised that the subject should receive their best consideration. We are living upon hope that they will give it their best consideration—perhaps more hope than expectation.

6037. How was it proposed to raise funds to construct the works; was any estimate made of the probable cost?—I have not heard of any estimate.

6038. (*Mr. Harrison.*) Where was it proposed by the memorialists to place the new weir and lock?—At the bottom of what is called Sion Meadows.

6039. (*Professor Way.*) There are two places mentioned?—I think one is below Brentford at Strand-on-the-Green. We think there is a very rapid fall below Kew, so that you could not make a weir there of sufficient height to preserve a head of water at Richmond, and there are many reasons why we desire to keep that head. We think that our welfare depends upon it. Richmond depends so much upon its scenic beauty that if you take away the water you take away one of the greatest elements of our prosperity.

6040. But if you flood the subsoil you will create an artificial swamp?—Yes; but I think we are sufficiently raised above that. Almost the lowest part of the parish, except where it immediately adjoins the river, is at least 14 feet above high-water mark.

6041. Anything that is done must be done by the Thames Conservancy Board, and therefore we may assume that it will be properly and well done?—Quite so.

6042. The memorial was signed by the inhabitants of Richmond and Twickenham, was it not?—The name given to it was "The Twickenham Committee."

6043. Is not the memorial called the memorial of the inhabitants of Twickenham, Richmond, and Isleworth?—Yes; and many of the gentlemen attended the meeting.

6044. (*Chairman.*) Do you know how the Conservancy Board is constituted?—I cannot say.

6045. Do you think there would be any objection on the part of the inhabitants of Richmond to strengthen the hands of the conservancy board to enable them to execute such works of improvement as may be necessary for the preservation of the Thames?—So far from objection, I think they would be very glad to do it.

6046. In a case like this it would be necessary to have some sort of coercive power to bring in all properties similarly affected; you could not improve the river for Richmond and not improve it for every property on the river above and below Richmond?—Certainly not.

6047. Therefore I suppose you would say that the area of taxation should be as wide as the extent of the benefit?—Most certainly.

6048. And that the form of government, whatever shape it takes, should have power to include all the properties that are involved?—I think that generally we should not much care about the form of government, provided the work was effectually done, and as moderately as possible.

6049. At the present time I suppose you have no representative at the Conservancy Board?—None whatever.

6050. With an area of taxation amounting to 72,000*l.*, if the whole rateable value is taken, do you think that you are fairly in a position to ask to have representation?—Decidedly, if that should be the principle adopted; that is to say, a local board to be selected from the parts most interested. There is no question but that Richmond ought to have one or two representatives—certainly one.

6051. Works of improvement involve funds necessary to execute them?—Quite so; they would tax us for the purpose.

6052. So long as it is equitable and reasonable, you think that we may fairly assume that the principal parties interested will acquiesce?—I think they would, as the benefit to be derived would be far more than commensurate with any cost to which we could possibly be put, looking to the value of the property.

6053. Richmond, we know, is a sort of pleasure-garden for the inhabitants of the metropolis; the river, the scenery, and the park form great points of attraction?—They do.

6054. If the river is left to deteriorate as you have described to us, I suppose you would contemplate serious injury to the welfare of the town of Richmond?—Yes.

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6055. A serious pocket injury to the inhabitants and the owners of property?—I think so. If you drive away our visitors and those who live here we must all suffer more or less, and property will deteriorate. Rents are now artificially high, owing to Richmond being a desirable place of residence; house command a much greater per-centage of rental than elsewhere, and if the Thames is to be left to its own natural tendencies, as I suppose we must call them, I am afraid that property will decrease very much in value.

6056. As representing the vestry, you would urge upon the attention of Government the necessity for making some provision to do away with existing nuisances, and for taking the necessary measures to carry out the works required?—Yes, I would most decidedly; but I have no right to say that I represent the vestry in giving that opinion, although I know that many concur in opinion with me.

6057. There are, I believe, gasworks in Richmond?—They are called the Richmond gasworks, but locally they are in the parish of Mortlake.

6058. Do they stand on the borders of the river?—No, they are a mile inland.

6059. Are they not supposed to add contamination to the river?—No, it is not possible.

6060. Do you know anything of the fish in the Thames?—No.

6061. I believe fishing is a recreation that is much sought here?—Yes, wonderfully so, in all sorts of weather; nothing seems to damp the ardour of fishermen.

6062. (*Mr. Harrison.*) Do you know the depth of water at low-water in the summer?—That would depend upon the part of the river. Close to the bank the bed is left bare, but taking the part from the bridge up to the Duke of Buccleugh's, the average depth is between four and five feet in the middle of the channel.

6063. How much do the neap tides rise?—Sometimes they do not flow much, the rise varies according to the wind, two or three feet. At spring tides they flow all over the top of the camp sheds about eight feet, at times 10 feet. Tides are very much influenced by the winds.

6064. (*Chairman.*) You stated that there would be a difficulty in dealing practically with the sewage of Richmond?—I have thought so.

6065. Has the question come before the vestry for dealing with it in any way?—There was a scheme proposed, and a memorial I think has gone to the Home Secretary upon the subject. The object was to provide a piece of land upon which to deodorize the sewage.

6066. (*Professor Way.*) You have said that you did not see your way to a profit by utilizing the sewage of Richmond?—Yes.

6067. I gather from what you stated just now that the importance to the town of not polluting the river is so great, even should the irrigation not be a source of profit but of expense, that you would probably be most willing to do something in that direction?—It ought to be done; but I may correct myself there, because our natural fall is towards Mortlake, where there are very extensive market gardens, the sewage might be of service there, and nothing that we could put on would be so offensive as the manure they put on occasionally. They bring up refuse from London in barges. The other day we were obliged to inflict fines upon the persons employed in carrying it, because it was so offensive, we never felt anything equal to it in annoyance, and they bring that up from London, it is sweepings of streets, slaughterhouses, and all sorts of garbage and refuse.

6068. Have you had any communication with the Metropolitan board on the subject of joining on to their sewer at Putney?—None.

6069. Do you lie higher above the river than Ealing and Hanwell?—I cannot say, but as regards Putney I take it as a self-evident proposition that the area of the ground must be lower, as the river naturally flows that way.

6070. I believe that the authorities of Ealing and Hanwell have asked to be allowed to drain into the Metropolitan sewer, and have been refused?—I think I have heard of that. I read it in the report of your proceedings at Kingston, and I should be sorry to find, that their works are so constructed as not to allow our sewage to pass on to their sewer, for it has always appeared to me to be the natural way of doing it.

The witness withdrew.

The following paper was handed in:

POPULATION of the Five Parishes in the Richmond Union, taken 8th April 1861.

PARISHES.	AREA.	HOUSES.				PERSONS.			POPULATION IN						Increase in the last ten years.
	Acres.	Inhabited.	Uninhabited.	Building.	Total.	Males.	Females.	Total.	1801.	1811.	1821.	1831.	1841.	1851.	
Richmond - -															
St. Mary's - -	1200	1,001	42	26	1,069	2,623	3,578	6,201	—	—	—	—	4,406	5,113	1,088
St. John's - -		838	36	6	880	2,067	2,653	4,720	—	—	—	—	3,346	4,412	578
Total - -	- -	1,839	78	32	1,949	4,690	6,231	10,921	4,628	5,219	5,994	7,243	7,752	9,255	1,666
Petersham - -	800	107	9	-	116	288	349	637	422	406	516	610	629	653	—
Kew - - -	346	197	3	-	200	487	613	1,100	424	560	683	837	922	1,009	91
Mortlake - -	2,000	652	24	15	691	1,696	2,076	3,772	1,748	2,021	2,484	2,698	2,768	3,110	662
Barnes - - -	900	413	38	5	456	1,001	1,302	2,303	860	994	1,244	1,417	1,461	1,879	424
Total - -	5,246	3,208	152	52	3,412	8,162	10,571	18,733	8,082	9,200	10,921	12,805	13,532	15,906	2,843
Decrease in Petersham - - - -															16
Total increase in the Union - - -															2,827

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ROBERT ALEXANDER SMITH, Esq. (of Richmond), examined.

6071. (*Chairman.*) What are you?—I am a solicitor and vestry clerk of the parish.

6072. What points do you wish to speak to?—I can only speak to the same points that Mr. Chapman did, as to the condition of the river.

6073. Did you hear Mr. Chapman's evidence?—Yes. I heard what he said, and I agree with him. You were asking what steps the vestry had taken as to utilizing the sewage. I may say that there was a committee appointed to consider the matter and to report. They made a report, in which they stated that the vestry were anxious to do all they could to divert the sewage from the river and to utilize it; but that as the Crown was the principal owner of land it was impossible to carry out any such system without interfering with their property. The Crown is the owner of the Deer Park and Kew Gardens, which occupy the south bank of the river for two miles. It was difficult, if not impossible, to do anything without the consent of the Crown, and they therefore recommended a memorial to the Secretary of State, asking for his assistance in the matter, and inquiring whether it was the intention of the Government to take any steps either to remove the existing evils, or to inquire as to the measures proper to be taken, and if he thought the initiative ought to be taken by the local authorities they would be glad to be advised with respect to the solution of some person in whom the Crown and Secretary of State would have confidence, and who might be employed to make the necessary surveys, and report upon the proper steps to be taken. That memorial has been sent to the Secretary of State, and the receipt of it was acknowledged, and it was stated to have been transferred to the Office of Woods. We have had no further communication from them on the subject.

6074. What was the date of that?—The memorial was sent about the end of September and the committee reported on the 23rd of September.

6075. Is there anything further that you wish to add?—No.

The witness withdrew.

E. H. Donnithorne, Esq.

E. H. DONNITHORNE, Esq., J. P., (of Twickenham,) examined.

6076. (*Chairman.*) Where do you reside?—The place is called Colne Lodge, Twickenham.

6077. Is there a local Board of Health at Twickenham?—There is not.

6078. Are there any local commissioners?—No; we have only appointed an inspector of nuisances.

6079. Is it a parish or township?—A parish, and a very large parish in area.

6080. Do you know what its area or population is?—The population a little exceeds 8,000, it was returned as about 8,000 at the last census.

6081. Is it a growing district?—Very much so.

6082. Are houses being multiplied on the banks of the river Thames?—Not so much on the banks of the Thames, but a good deal about the railway station and the common.

6083. In which direction does the sewage go?—Into the Thames.

6084. Is there any system of sewerage in the district, or are there cesspools?—We have very few cesspools left. I dare say half of them are destroyed; the drainage has been very much increased, not by new drains into the Thames, but by diverting new drains into the old, so that the drains into the Thames bring down now certainly twice the quantity of filth they did before.

6085. The end and aim of the parties having been to pass away the refuse from their own premises and get it into the Thames?—Yes; and here I should say that we are now a good deal puzzled in the summer by it, not on account of the quantity of sewage that goes into the Thames so much as by its running over so much gravel that it is exposed to the hot sun. I have been living at Twickenham for about 28 years, and I can recollect when I could pull up in a boat with great ease, but now, between Richmond and Twickenham, it is with the greatest difficulty in hot weather that one can get up at all.

6086. Is that in consequence of the abstraction of the water by the water companies and lowering low-water line by the operations at London Bridge, or by the accumulation of gravel at that point of the river, or all three combined?—There are two or three reasons, and the principal one is the quantity of water that is abstracted by the waterworks companies and taken to London. Secondly, the drainage of all England has a little to do with it; land drains naturally take off water quicker, instead of constantly soaking into the river by degrees it brings down a flood suddenly. I mean land draining operations in the midland counties, in Gloucestershire and adjoining counties; but that has not, however, half as much to do with it as that abstracted for the supply of London. I think that is the principal cause.

6087. How far are you below Teddington lock?—We are about a mile.

6088. Do you ever go to Teddington lock?—Yes.

6089. Have you ever seen Teddington lock without any water flowing over it?—No, I cannot say that I have.

6090. I mean this, have you ever seen the weir without any water passing over it?—Never.

6091. Do you find more difficulty in boating now than when you first knew the Thames?—A great deal more.

6092. May that not arise from the silting up of the river, from the abstraction of water by the water companies, and from a reduction of the low-water level by dredging operations at London Bridge?—As a committee we have gone into that subject, and we think that it is entirely from the want of water coming down, and that nothing will save us now but a new lock and weir; we think that a lock would be of more use than anything else, and give us plenty of water to row upon, the sewage might then soak into the water, and not smell as it does now on a hot day, running over bare gravel.

6093. You have heard what has been stated as to combined action for sewerage purposes, to move foul sewage matter from the river?—Yes.

6094. Do you think it would be fair to let you use the pool you have helped to create while your neighbours were compelled to take their sewage away from the river?—No; and we are willing to do whatever our neighbours do.

6095. You would join in any combined scheme that would be carried out for the benefit of the whole?—Certainly.

6096. I suppose your idea is that the new reach you have proposed would give you in fact a full river at all times independently of the state of the tide?—Yes.

6097. And put you in the same condition below that the river is in above Teddington?—Yes.

6098. You think that would be an advantage to your property and to the river?—Certainly; and as all young men now think of rowing, I dare say that a great number do not come up from London to stay here because they cannot row up the Thames as they used to do.

6099. That is a matter that will not be decided by this Commission. The Conservancy Board now having jurisdiction over the river it will be a matter for their consideration?—We have sent a memorial to the Conservancy Board, and I may say that the feeling of the committee was this, that as the conservators receive, as we understand, upwards of 2,000*l.* a year for the sale of water to the different water companies,

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they could afford to do something in supplying us with locks. I am satisfied that the inhabitants generally would be happy to contribute a part towards making the lock and weir, but we are informed that the expense would be something like from 25,000*l.* to 30,000*l.*, and we could not raise that amount of money; although we are well inclined to do as much as we can we think that the conservators might be inclined to do their share.

6100. Taking the case of the riparian owners having river frontages, they feel the disadvantages of the present state of the Thames and would very gladly, I suppose, wish to have such improvements made as would benefit their estates; do you think that if a rate was levied in proportion to the benefit conferred it would be unfair?—No, I do not.

6101. The same as in the case of towns improvements, the persons owning the land which is laid out in new streets have to find the money to put such street in order down to the centre of the street opposite their own property?—Yes; I think that would be fair; I believe that the conservators who have injured the Thames by allowing so much water to be taken out of it should pay one-half or something of that kind.

6102. It would be their duty the same as in street improvements, when the thing was fairly started to take it in hand and for ever maintain it?—I should think there would be no objection to such an arrangement.

6103. To what extent do you consider pleasure boating has been injured opposite this particular part of the Thames?—It has been injured particularly between Twickenham and Richmond; it is almost impossible at low water in summer time to get a boat up, because it will ground in several places.

6104. The land on both sides of the river for some distance above and below Richmond is not much I think above the level of high water; are the lawns ever flooded at high water?—Never; Twickenham stands on a bank 10 or 12 feet above the river in most places, and I have never known a flood in Twickenham.

6105. Is Ham Common or the property near to it subject to floods?—Not of any consequence; now and then, in a very high tide, the water has gone over, and perhaps nowhere more than at the Duke of Buccleugh's.

6106. The tendency of a lock and a weir at the lower part might or might not have a mischievous effect; it would depend upon the engineering arrangements made, but you might have such a work constructed as would seriously water-log and occasionally flood the land above?—We hope that allowance would be made for that.

6107. You think that you might construct works and manage them so that they would not injuriously flood the land above?—I think we are more injured now by a flood than we should be then, for if we have much water running down the Thames and it is met with a very high tide and a strong east wind, the water that comes up causes the flood to be much higher than if it was stopped by a lock, which would operate as a check to the great flow of water to Twickenham.

6108. Are there any other points to which you wish to speak?—I think I may say that our board are unanimous in opinion as to a lock and weir, thinking that we might be able to get up subscriptions in part-payment of the cost.

6109. You had one interview, I believe, with the Thames Conservancy?—Yes.

6110. Did they hold out any hope that they would carry out your wishes?—I was not at the meeting.

6111. Are there any frontages that come down to the Thames on sale?—I do not think there are any.

6112. What do you think such frontages, if there were any, would sell at per acre?—At a very high figure; something like 2,000*l.*

The witness withdrew.

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RICHARD ARCHER WARWICK, Esq., M.D. (of Richmond), examined.

6113. (*Chairman.*) You are a medical man in practice in Richmond?—Yes.

6114. For what length of time have you resided here?—Between 10 and 11 years, and part of the time on the bank of the river.

6115. Have you known the river well during that time?—I think I may say so, having lived upon its banks a portion of the time.

6116. It has been your habit, I suppose, to observe the condition of the water?—Yes.

6117. Have you noticed any alteration in it since you have taken up your residence here?—Yes. I have observed that there is very much less water in the river than there was before.

6118. You would have observed that last summer, I suppose?—Yes.

6119. You are aware that last summer was exceptionally dry?—Yes, it was.

6120. Was the state of the water any worse than you had known it before?—Yes, I think so.

6121. Have you reason to believe that you could attribute any disease to it?—No, I do not think I could do that, not simply to the state of the river; there is no doubt that it would produce disease, but I cannot bring forward any particular fact or instance.

6122. The river is used very extensively is it not for bathing?—Yes, of an evening, just above the bridge.

6123. The water for the supply of Richmond is taken at a point above the weir at Teddington?—Yes.

6124. The state of the river below does not affect that water supply?—No, it is taken from above Teddington lock.

6125. Do you know anything of the sewerage of Richmond, and whether it is completely sewered or not?—I believe it is not completely sewered. There was a plan some years back suggested by Mr. Donaldson, but it was never fully carried out. The sewage runs in to the sides of the river.

6126. There may be a considerable number of cesspools still in existence?—Yes, in the lower parts of the town, in the Mortlake Road, and in that direction, and in a place called Night and Morning Row.

6127. Do you meet with any cases of typhus or typhoid fever in Richmond?—Yes, it is prevailing now.

6128. In what parts of the town does it prevail?—Chiefly in the lower parts of the town, also near the river.

6129. Is it prevalent in the confined parts of the town?—Yes, in the Mortlake Road more particularly; but it is amongst a class of houses where fever always does prevail at this time of the year, and where it is more due to the condition of the houses than anything else. It is typhoid fever.

6130. I believe there is a very general and widespread prevalence of fever this autumn?—Yes, throughout all England, more or less.

6131. Is it of the same type generally?—Yes, typhus and typhoid fever. We do not get intermittent fever here. We have not those cases which you would expect to find on streams and rivers.

6132. Do you think that any improvements could be carried out that would mitigate this class of fevers, or assist in removing them?—Yes. I think if the drainage of the town was altered, and the cesspools removed in the worse districts, that typhus fever would not prevail as now.

6133. Do you know what the death rate is in Richmond?—Yes; the death rate for the last year was 21 in 1,000.

6134. And for the present year so far as it is gone?—There have been about 24 deaths in a month, but I

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do not know the death rate in 1,000. The total number of deaths in the last five years have been as follows:—in 1860, 265; in 1861, 215; in 1862, 205; in 1863, 219; in 1864, 247. The population according to the last census was 10,921, and I should calculate the probable increase during three years to have been about 500.

6135. (*Professor Way.*) Mr. Chapman stated that the numbers had increased by 2,000 since the last census ?—Yes.

6136. (*Chairman.*) The mortality in England varies from about 17 in 1,000 to 45 ?—Yes. In Liverpool and other towns it is very high indeed. I think the average is 24 or 25 for all England, and therefore we are low.

6137. You are high as compared with Salisbury, Worthing, Ely, and Croydon. Although Croydon is said to be afflicted with fever just now, yet the annual mortality is about 17 per 1000 ?—Yes; but I think one ought to remember that at Croydon the whole system of drainage was improved, and at Salisbury also a large sum was expended, and the same at Worthing, while nothing has been done at Richmond to improve the drainage of late years.

6138. (*Mr. Harrison.*) Do you attribute the higher rate of mortality in Richmond to the want of proper drainage ?—Yes, for the want of putting the town in a proper sanitary condition; but the death rate of the five parishes of the union—Richmond, Petersham, Kew, Mortlake, and Barnes—does not amount to more than 17 per 1000.

6139. (*Chairman.*) Is it within your observation that strangers coming to live at Richmond are liable to contract fever or sickness at first, either from the water or something connected with the place ?—Yes, I am aware of that; it does occur in a measure, but I attribute it more to this circumstance, that a large number of new houses have been built, and the houses and drains are not always in good working order. When you go into a new house the drains do not act so well as they should, and I attribute it more to that than anything else.

6140. Are you aware that it is much more difficult to sewer safely a place like Richmond, with its steep gradients, than it is to sewer a place that is much flatter ?—Yes.

6141. If Richmond is not sewered upon proper scientific principles, and if great care is not taken to pass off the gases arising from decomposition, the best houses in the higher parts may be in a worse condition than if there were no sewers at all ?—Yes; that was the first effect produced at Croydon.

6142. You are perhaps not sufficiently acquainted with the sewerage in Richmond to say whether what I have pointed out has been attended to ?—No.

6143. If it has not been attended to, you would say that it is the duty of the authorities to attend to it ?—Yes. Some ventilating shafts have been introduced into the sewers in the higher part of the town to carry the gases off in two or three places, and no doubt that obviates the evil in a great measure.

6144. If you introduce shafts they will only take away the gases in the immediate vicinity of those shafts ?—Yes.

6145. If there is an intervening range of houses, and a drain from them passes uninterruptedly from the sewer into each house, you make the house itself, in such weather as this, with an external temperature of 33° or 34°, and an internal temperature of 60° or 70°, an exhausting pump drawing in air from every point it can get it, and if it does not obtain pure air freely it will get it from the sewer and drain ?—Yes. I believe that really is the case if the drains are not properly trapped. The gas from the sewage was so strong at Croydon that not only did it blow out the traps at the works, but it blew out the traps in the main drains, and it blew out the traps between the houses and the drains.

6146. The truth is that traps in house drains and in sewers, if the system of drainage depends upon them, are a delusion and a snare. There are no known means of keeping them in order, and therefore they never ought to be depended upon. When water has absorbed its full charge of gas it passes it off again, so that water is no longer a barrier to the gas ?—Yes.

6147. Have you made any observations upon the relative mortality in the lower part of the town and in the upper and better parts of it ?—I have been striving to carry out such a plan during the last 12 months, but the tables are not made up yet. The results of the observations have only been tabulated during the last two months. We divided the town into six districts, the hill district, the green district, the town district, the river-side district, the Mortlake and Kew road district and the Marsh gate district.

6148. What was the result of your observations ?—That the greatest number of deaths had occurred in the Mortlake and Kew district, where the poor are much congregated together, and where fever at present predominates. In the green district the deaths have not been so high. In the river-side district there have been no deaths at all in either month.

6149. You say that the mortality in the town of Richmond is 21 in 1000, and the mortality of the whole union about 17 per 1000 ?—Yes, that is for the year 1864.

6150. The mortality in some parts must be very small indeed, and where does the minimum mortality take place ?—In Richmond it is 21 in 1000, in Petersham it is 14, in Kew 18, in Mortlake 19, and in Barnes 14.

6151. Can you attribute these differences in the mortality to any peculiar local circumstances in these villages and towns ?—I cannot. I have gone into no facts, with the exception of Richmond.

6152. Do invalids take up their abode in Richmond for any length of time and do they die there to any extent ?—Yes; our death rate is certainly made higher by, I believe, two causes. First, by invalids who come here and die, and also by deaths that occur in the workhouse. Paupers are sent in from other divisions of the union, so much so that I may mention that in September last there were six deaths in one month from those two causes—three amongst the visitors and three in the workhouse. In the last month the deaths in the workhouse were five.

6153. (*Professor Way.*) Out of 25 as the average ?—Yes.

6154. (*Chairman.*) Is there any fever in the workhouse at the present time ?—I am told that there were two cases in the workhouse a fortnight ago, but they were both brought from Barnes.

6155. From some of the cottages there ?—I do not know.

(*Mr. Chapman.*) Sometimes it will happen that tramps come to the workhouse and their number is rather increasing.

6156. (*Mr. Harrison.*) (*To the witness.*) Do you practise also at Twickenham ?—Yes.

6157. Do you know the death rate there ?—No; I have taken these figures simply from the registry.

6158. (*Professor Way.*) You have stated that the death rate at Barnes is low ?—Yes; 14 in 1000.

6159. Do you know that some years ago there was much typhoid fever at Barnes ?—I believe there was, but I have no account of it.

6160. (*Chairman.*) Would gastric fever be promoted by the use of bad water ?—Yes.

6161. By water contaminated with sewage ?—Yes; typhoid fever arises from any decaying animal or vegetable matter.

6162. (*Professor Way.*) And it will occur in isolated houses ?—Yes; it is intermittent fever that you get where the surfaces of the land are exposed, and where the sun acts upon the exposed surfaces. As soon as they become covered then the fever is lessened. Although the lower parts only are covered you do not get fever. If you mount up a little higher on the banks of the river, where they have been simply moistened, there will be more liability to intermittent fever than lower down.

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6163. (*Chairman.*) Is typhoid fever liable to affect persons well to do in life?—It is just in this way, that well to do persons are generally in a higher state of health, and therefore they are not so much under the influence of poison of that nature; but if their houses are in a bad condition they are just as liable to it, only that it would attack the more weakly members of the family first.

6164. Have you anything like ague there?—No.

6165. Did ague ever prevail in this district formerly?—I do not know.

6166. Are you aware that there has been a very great alteration in that form of disease all over Great Britain?—Yes.

6167. And that in many places where ague prevailed one or two centuries ago no such thing is heard of now?—Yes.

6168. Do you know whether it is also true that typhus and typhoid fever have become more rife within the last quarter of a century?—Typhoid fever has certainly become more so. In some districts typhus has diminished, but it has also increased in many districts, such as in large manufacturing towns—it is always present in Liverpool, Leeds, and London.

6169. Do you think that defective sanitary arrangements might or might not have anything to do with it—for example, drains in which deposits take place, and from which foul gases are carried back into the houses?—They would have almost everything to do with it.

6170. Therefore, in many places where improvements have been carried out, they may ignorantly have brought about the evil they wished to avoid?—Yes, exactly, as at Croydon, until that state of things was remedied.

6171. You are aware that at Croydon for some years there has been a very low death rate?—Yes.

6172. Have you seen Dr. Carpenter's report?—No.

6173. (*Professor Way.*) I think you stated that in one month, or at one time, the river district was entirely free from fever?—It was so in both the months I have referred to; but I must state this, that the division we have made of the river district comprises some of the best houses in the town, and that the river district simply runs from the railway bridge to the Duke of Buccleuch's. All those houses are inhabited by the better classes, and the population is very small, therefore I do not think it would be any guide. The banks of the river are certainly very bad as to smell where the sewers discharge, but I do not think Richmond is so bad as it is when you get to Isleworth. With regard to the construction of a weir and lock, although it might be an immediate advantage, I do not think that in the long run it would be so, unless the sewage was cut off or taken away altogether; as long as the sewage runs into the river I think we should be in a worse condition with a lock and weir than without.

6174. (*Chairman.*) If you had a pound lock and a weir you must do two other things—you must intercept the sewage and maintain the pool by regular, efficient, and uniform dredging?—Yes; or have a sufficient flow of water always to scour the bed of the river.

6175. Did you observe the condition of the surface of the river during the last summer as to anything causing a nuisance floating down, dead dogs or other animals?—Yes.

6176. Do you not think that the removal of such nuisances ought to be made the duty of some person or other?—I think so, because they are a source of disease.

6177. By what company are you supplied with water?—I believe by the Southwark and Vauxhall Company.

6178. Do you know where they filter the water?—I do not.

6179. (*Professor Way.*) Do you consider that you have a good water supply?—I believe so.

6180. (*Chairman.*) Is it true that there has been much less diarrhœa since the water supply has improved?—I think so.

The witness withdrew.

Mr. R. Beard.

Mr. Richard Beard (of Richmond) examined.

6181. (*Chairman.*) Are you inspector of nuisances at Richmond?—Yes.

6182. Do you report occasionally to the vestry?—Yes, on all occasions when there is a nuisance.

6183. Are the reports ever published; do you write them out, or do you report verbally?—I write them out.

6184. How frequently do you report?—Whenever there is a nuisance to complain of.

6185. Have you any common lodging houses in Richmond?—Yes; but they are under the police.

6186. Have you any slaughter-houses?—Yes.

6187. How many?—There are eleven.

6188. Are they situated behind the butchers' premises?—Yes, in all cases.

6189. Are they in open or in confined places as a rule?—In some places they are confined very much, in others they are open.

6190. What condition were they in last summer, were they in a bad condition?—Yes, they were. I often visited them and kept them as well as I could, still there was a smell from them.

6191. Has there been any complaint from the neighbours as to those slaughter-houses?—Yes.

6192. What means do you take in order to get the nuisance abated?—I only act under the Nuisance Removal Act.

6193. Do you use disinfectants?—Yes.

6194. Where does the blood and drainage go to from them, into drains and sewers?—Into the common sewer.

6195. Then that empties itself into the Thames, I suppose?—Yes.

6196. Has there been any talk of providing slaughter-houses outside the town?—Yes. I may add that formerly the butchers were obliged to obtain a licence before they could slaughter animals in their slaughter-houses; but it was repealed, I believe, in the House of Parliament.

6197. When the weather is unfavorable, and these slaughter-houses are in their worst condition, is it injurious or beneficial to the butchers to be in that condition?—Injurious, decidedly.

6198. Do they make any complaint against your inspection or of your informing upon them?—No.

6199. Do you think that if they had the option of having better and cleaner places to slaughter in they would prefer it?—I should think they would prefer it; but they are like all other persons in their position, some are very dirty, and some are very clean.

6200. Have you had any cattle plague in the vicinity of Richmond?—No, not that I know of.

6201. In which part of the district have you found that cases of fever prevail most commonly?—I do not know that there is any particular district. I have not heard of any fever except it is in the lower part and the upper part, the two extreme ends. I have the sewers under my supervision as well.

6202-3. Have you any power, in the event of fever breaking out, of ordering anything to be done with regard to cleansing the foul middens or lime washing?—Yes. Under the Nuisance Removal Act we can compel lime washing.

6204. Suppose you found bedrooms in which sick people were placed that had no window that could open, have you any authority to ask the landlord to make a window that will open?—Yes; but if he refuses I cannot compel him.

6205. I suppose you know that under the Common

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Lodging Houses Act the police can compel parties to have windows that will open ?—Yes.

6206. And to have sufficient bedclothing, and to have the walls lime-washed at regular intervals, and to have proper cleansing ?—Yes.

6207. Do you think that there would be any hardship if you had similar powers with regard to the cottages ?—Not at all.

6208. That would be a benefit to all parties, would it not ?—Yes, and particularly as to house drainage; that is the failure. All this disease is brought about by defective house drainage, not by defective sewers. We have sewers as good as in any town in England, but the house drains are defective. They generally use bell-traps, and servants who do not understand them pull off the top, and then it becomes a funnel to admit all the gases into the houses.

6209. And the consequence is that you have an excess of disease both at the bottom of your system and at the top ?—Yes ; but we have made ventilators at the top, and we have charcoal deodorizers placed in the sewers at different parts.

6210. (*Professor Way.*) Opening into the street ? —Yes.

6211. (*Chairman.*) Have you had your attention turned to the ventilation of the sewers ?—Yes.

6212. Do you know whether the waterspouts are connected with the sewers or drains ?—In some cases they are.

6213. Are they left untrapped ?—In some cases they are. I always advise them to leave them untrapped if they carry them above the roof.

6214. Are the sewers flushed at any regular intervals ?—No ; we have certain entrances to enable us to see what the state of the sewers is, and we flush and cleanse when it is required.

6215. Do the men who work in the sewers and flush and cleanse them ever suffer from the foul gases ? —Not that I am aware of.

6216. Are there many cesspools in the district ?— I do not know of one

6217. If there are cesspools they are covered up and you do not know of them ?—No; but there is a regular system of house drainage here, and in the event of a cesspool being offensive I should serve the party with notice to remove it and to substitute house drainage, and they would do so I should think for their own sakes, because house drainage is much cheaper than a cesspool that continually wants emptying.

6218. Is the public health any better or worse since the sewers were put in ?—We are better.

6219. Do you think there is anything still to be done to put you in a better condition ?—I do not see how it can be done without there is more ventilation as it is found to be required. Our sewers are rather particularly constructed and flushed as they have two overflows out of the park, where there is a continual spring, and some part of our sewers you might wash your hands in the water and you would not smell it.

6220. This water is continually diluting the sewage and washing the sewers out ?—Yes.

6221. (*Mr. Harrison.*) Is that the sewer that empties itself just below the railway bridge ?—Yes ; it receives all the nuisance, and it empties itself there.

6222. I could perceive a very distinct coloring of the water from the sewage discharged out of the mouth of that sewer into the river ?—Yes; that comes from the lower parts.

6223. (*Chairman.*) Have you noticed the condition of the sewage outflows into the river ?—Yes.

6224. Does the sewage kill the fish ?—No ; that is where the anglers resort ; they are there as thick as ever they can be.

6225. Then you do not think that the sewage kills the fish, but feeds them ?—I should say so ; there is something there which they enjoy it appears.

6226. (*Mr. Harrison.*) How is it when the sewage goes a little further down and gets landed and adheres to the banks ; does it feed the fish then ?—I cannot say.

6227. (*Chairman.*) How long have you known the Thames to notice it ?—For 35 years.

6228. Do you think there is less water now at low water than there used to be ?—Yes ; decidedly.

6229. Do you think the river is any fouler than it used to be ?—It is improving now here ; before the sewage was taken out of London we used to have it here with very high tides, spread on the banks and on the foreshore, and there the smell was very offensive.

6230. Have you found a perceptible difference for the better ?—Yes ; the water is much clearer.

6231. You heard what was said about the incoming tide driving the mud up from the bottom of the river and making a foul smell ?—Yes.

6232. Have you observed that ?—No ; I have not recently.

6233. Have you heard anything said about making a pond opposite Richmond to keep up the water by putting a lock and weir below ?—I have heard that such an idea has been entertained.

6234. Do you think that the lowness of the water in the river arises from anything that has occurred below or from the pumping of the water out of the river by the companies above Teddington weir ?—I think it arises from both causes ; the pumping would take away part of the water, and then again the arches of the different bridges are not so obstructive to the passage of the water as they were.

6235. The water runs down to the lower level ?— Yes.

6236. (*Professor Way.*) Is there no manufactory in Richmond ?—No.

The witness withdrew.

Mr. WILLIAM WHEELER (of Richmond) examined.

Mr. W. Wheeler.

6237. (*Chairman.*) What are you ?—A waterman.

6238. How long have you resided in Richmond ?— 50 years.

6239. Have you worked on the Thames all that time ?—Yes.

6240. Are there more pleasure boats on the Thames now than there used to be ?—Yes ; double as many.

6241. Do you know how many companies pump water out of the Thames above Teddington lock ?— Five.

6242. Do you think there is any difference in the volume of water in the Thames of late years ?—Yes ; a great deal.

6243. Is there less water below Teddington lock than there used to be ?—Yes.

6244. Do you remember the condition of the river before old London Bridge was taken down ?—Yes.

6245. Have you observed any difference since the removal of that bridge ?—Yes, a great difference. Formerly there used to be at Chiswick and below Hammersmith Bridge lots of weeds, and at Chiswick rushes half as high as the room grew there, but there is nothing of the sort now ; there used to be hills which they have ballasted away, they kept the water up, and I think that the ballasting has taken away as much water as the water companies in the lower part of the river.

6246. It has run the water down ?—Yes ; they began the ballasting at the wrong end ; they should have come to Teddington, and have begun there.

6247. Would you rather have the river ponded or ballasted down to deep water ?—I think ballasting takes away the water, and therefore I should rather have a weir and a lock.

6248. Have you noticed whether the water is fouler now than it used to be ?—It was very foul this last summer.

6249. Has it been fouler than you have known it before ?—Yes ; it was very bad this last summer, because it smelt so.

6250. Then the intercepting sewers have not done

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you much good?—We have not derived much benefit. I know that they have taken the water away.

6251. Have you any difficulty in rowing your boats along at low water now?—At low water we can hardly get up with a party in a boat.

6252. How much water would the boat draw?—Three or four inches.

6253. You find a difficulty in getting up with a boat drawing so little as that?—Yes, at low water.

6254. Spring tides?—Yes.

6255. Or any tide?—Yes; it gets worse every year, lower and lower.

6256. Is there as much fishing in the Thames as there used to be?—Yes, double as much; there is more fishing every year.

6257. Has any part of the Thames frontage been embanked since you can recollect it?—Yes, some of it.

6258. Would it be any advantage to the boating if the river was generally embanked, so as to cover the shoal water?—I do not know that it would in the long run make any difference. If you embanked much you would take in many nooks from which it would not run away so fast. The embankment would make the water run away fast.

6259. If the river was embanked there must be a lock and a weir?—Yes.

6260. Where do you think that should be placed?—The best place would be at the bottom of the Duke of Northumberland's, just on this side of the Great Western basin, down by Isleworth, and joining Brentford.

6261. Do you know the river above Teddington lock?—Yes.

6262. And how high up do you know it?—I have been to Oxford.

6263. How recently?—I was at Pangbourne last summer.

6264. In what condition are the locks there?—Very bad many of them, and the river is full of weeds.

6265. Did you pass through any of the locks?—They looked very dangerous; several of them are in a very bad state.

6266. How long have you known the upper part of the river?—30 years; it is 20 years since I was up at Oxford.

6267. Do pleasure parties often wish to go up as far as Oxford?—Yes.

6268. How long would it take to go up in an open boat?—That depends upon how the people can row; but it is more fashionable to send boats up, and for the people to come down in them. We have had more this last year down from Oxford than there had been for years before; it is getting very fashionable now.

6269. (*Mr. Harrison.*) Independently of the state of the locks in the upper part of the Thames, have you seen much difference in the navigation as to the bed of the river and depth of water?—No, I have not noticed that; the water stands pretty well above the lock.

6270. (*Chairman.*) Are there more or fewer weeds than there used to be?—A great many more weeds and water lilies.

6271. Have you seen the American weed here?—I do not know that we have that. We used to have a great quantity of weeds here, but we have had none this last summer. From Petersham up to Twickenham to the Eel-Pie House there used to be a large quantity of weeds, but there are very few this summer.

6272. If any of the boatmen saw a dead dog floating about, would they take it up or leave it alone?—They are glad to get away from them, they smell so badly.

6273. (*Mr. Harrison.*) What kind of fish do you catch here?—Barbel, roach, dace, and gudgeon, and now and then there are some bream and jack, not very often. They catch trout at times, but very few; two or three were caught about here last summer in the month of May.

6274. (*Chairman.*) Did you ever see salmon in the Thames?—No.

6275. Did you ever hear of anyone that did?—Yes, I heard of one being taken at Wandsworth two or three years ago in the mud.

6276. Was it considered a good fish?—Yes.

6277. Do you believe that it had been bred in the river?—No.

6278. (*Professor Way.*) Is fishing profitable as an occupation, or could a number of men obtain a living by selling the fish they caught?—No.

6279. A man could hardly earn 2*s.* 6*d.* a day by selling the fish he caught?—No.

6280. (*Mr. Harrison.*) Have you observed the places where the different kinds of fish deposit their spawn?—No.

6281. What kinds of fish are caught off the mouths of the sewers?—Dace principally, and bleak; now and then they catch a roach, but not very often.

6282. (*Chairman.*) Have you ever noticed the mouths of the sewers after a thunderstorm?—No.

6283. Have they at all annoyed you during the last summer?—The smell has been very bad.

6284. Have any of your customers complained of it?—Very much, because the water has been so low.

6285. (*Mr. Harrison.*) Is the condition of the banks bad as well as the sewers themselves?—Yes; when the tide has left the bank, and when a hot sun has come on it, it has smelt very badly.

6286. The nuisance was not confined to the outlet of the sewer, but it proceeded from the banks of the river generally?—Yes, where the tides leave them.

6287. Have you found much of that foul deposit in the bed of the river that is covered at low water?—Not so much there, not out into the channel; the deposit is more on the banks of the river.

6288. So that almost all that is deposited is exposed to the sun when the tide is out?—Yes; you might see the gravelly bottom where there is no filth upon it up the stream.

6289. Are the persons who ballast the river put under any restrictions as to where they should take the ballast from?—Yes.

6290. Who regulates that?—The conservators; they have people who look after that to see where it is taken from, and they fine them if they do not take it from the right places.

6291. Is there any steam-dredging carried on?—The conservators have had one that has been on two or three occasions up here; it was up above Twickenham.

6292. Below Isleworth there is a considerable bank just below the island?—Yes.

6293. It runs out from the towing-path?—Yes.

6294. This morning I saw a large punt stuck upon it, and they said they would have to stay there until the tide came up?—Yes.

6295. It must be a difficult place for vessels to pass that are being towed?—It is rather.

6296. The channel is so far from the towing-path?—Yes.

6297. Do barges and punts frequently run upon that bank?—Yes, at neap tides.

6298. Do the conservators take any steps to remove that bank?—They have ballasted there several times.

6299. What kind of ballast do they take out?—Gravel and sand.

6300. Would not that be useful ballast to take from the bed of the river?—Yes.

6301. Would it not be an advantage to the navigation if that bank was removed?—Yes, it would; still I do not think it would do so much as a lock would to keep the water up.

6302. (*Professor Way.*) If the proposal to make a lock and weir at Isleworth were to be carried out there would possibly be much pleasure-boating above on that part of the Thames?—Yes. There are many persons who leave Richmond because there is not sufficient water, they cannot row there; they very often go to Surbiton and Kingston.

6303. What is the length of the reach from Teddington to Brentford?—Four miles and a half.

6304. (*Mr. Harrison.*) If it were made at Brentford, from Richmond what would the distance be?—$2\frac{1}{2}$ miles.

6305. (*Professor Way.*) That would make a good

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pleasure lake?—Yes; there is a fine piece of water from Teddington.

6306. Which is the part of the river where boating is difficult at low water?—From the Duke of Buccleuch's to Twickenham.

6307. Is there a want of water below Brentford?—The water is lower and the tide flows so much quicker, but they are not so long without water as we are; it is an hour and a half before it reaches Richmond.

6308. They have more tide than you have?—Yes; the lower down you get, the more tide they get.

6309. (*Mr. Harrison.*) Do the neap tides flow to Teddington?—Sometimes; not if the wind blows down the river. At one time this last summer there was a barge got on the ground just above Cross deep, and it lay on the hill there for a week.

6310. (*Chairman.*) How much higher have you known the wind when blowing up stream drive up the water than it would have risen without the wind?—About two feet.

6311. It has been raised in head two feet by the wind?—Yes, with a spring tide, and the wind away from the north-east.

The witness withdrew.

Edwin Chadwick, Esq., C.B. (of Richmond), examined.

E. Chadwick Esq., C.B.

6312. (*Chairman.*) The Commissioners will be glad to hear any evidence that you are prepared to give upon the subjects referred to them for inquiry.—As I live in Richmond I have occasionally gone on the river, and I have observed it in ordinary times, when the sewage, I presume, has been flowing into it in the ordinary manner, very clear; and when freshets of rain have come down I have seen it very thick like pea-soup. I am in the habit of taking baths here, but on some occasions I have been deterred from using the bath. Twice when I went to take a bath the water of the bath smelt, it was very bad, and the water was highly coloured, it smelt to me distinctly of stable dung. I was told by the bathman that that was the condition of the water sometimes after heavy falls of rain, and going on the river sometimes with the boatmen and others they have particularly pointed out, or at least it has been stated to me, that from some places after heavy rains there is a great discharge from the outlets, some of them being near to the market garden land; and there are apparently solutions of dung or at least highly-coloured discharges come from the outfalls near the market garden land. Reasoning from what I saw, or rather from what I experienced on the occasion that I have mentioned, I was particularly struck with the smell of the stable dung in the hot bath, and with the condition of the water supplied. Sometimes in the summer time when it is taken up near here, supposing the sewage to be entirely diverted from the river, there is a great amount of a sort of pollution, arising from surface washings of market garden lands, and the lands so cultivated within the district. I may mention as an example of the extent to which manure is applied to the surfaces near here, that one considerable market gardener, Mr. Norris, of Isleworth, who died a year or two ago, told me that he paid 3,000*l.* a year for town stable manure. I apprehend it was obtained much at the price of cartage, and it was applied to 365 acres.

6313. (*Mr. Harrison.*) Do you know how many tons of manure were so applied?—I do not know. I have heard hereabout that some of them pay as much as 20*l.* an acre for the manure they apply to the surface.

6314. (*Professor Way.*) That was the smell direct from the market gardens?—Yes.

6315. (*Chairman.*) The inspector of nuisances has stated that slaughter-houses are connected with the butchers' premises in the town in confined places, I suppose you think they ought to be removed?—Of course.

6316. And it was also stated that there is at the present time typhus fever and certain cases of typhoid fever prevailing in the lower parts of the town?—I think there are some gentlemen here who had to conduct a sanitary investigation, and they found that the town generally was exceedingly ill-drained. Even those mansions at the top of the hill that I know are some of the first mansions in the town, were found riddled underneath by cesspits, and I believe that in every fifth house there had been a disease something of the nature of diarrhœa, and that would be likely to be affected by these bad conditions.

6317. The inspector of nuisances and Mr. Warwick, a medical gentleman, stated that cases of fever occur at the two ends of the system—that is to say, in the lower part and in some of the higher parts of the town?—It has been stated that there have been repeated attacks of fever in some of the first-class houses on the hill. Then, in relation to the question of surface washing, I do not think that much of the land hereabout is under-drained systematically, but the park has been under-drained, and before it was under-drained I observed an outfall from the park which occurs some little distance down by the railway, discharging very thick matter. That was in a state of turbidity approaching the appearance of pea-soup. The under-drainage water will be in a very different condition from that which was obvious and visible before the drainage of the park had taken place.

6318. (*Mr. Harrison.*) You mean that the water will come from the subsoil more pure?—Yes; without the surface washing of the ground.

6319. (*Professor Way.*) The inspector of nuisances told us as much as that; he said that the water coming from the park and diluting the sewage actually made the sewage so clear that you might wash your hands in it without offence, consequently the water itself must be pure?—I particularly noticed that.

6320. You think that in the case of these market gardens which are very highly manured, a heavy fall of rain or a storm would carry a large quantity of manure into the river?—Yes.

6321. And, further, you think that ought to be prevented in the interests of the river by subsoil drainage?—Yes, certainly. I think that much of the appearance of the Thames is owing to that.

6322. I understood you, I think, to say that as heavy storms will wash solid matter from the surface of the soil, and you almost carried it to grass land put under drainage, there was no certainty of the water even going off the surface of the grass land in a state of cleanliness, by which you meant, I presume, that if the land in the neighbourhood of the Thames was not under-drained we must expect at times of storm to take the polluted water into the river?—Certainly.

6323. But you did not say that it was impossible to purify the sewage by putting on to the land, if it was put on in a judicious manner?—If it was put on in such a way, that is, adjusting the dose of sewage to the receptive power of the land, there would be very little to go off; there would perhaps be some fibrous matter still washed away; but with respect to the surface washing of park lands or pasture lands, I know from the sort of evidence that I have had in one instance, that water meadows were formed in a valley, and they were beginning to drain the uplands, and I had the evidence of a person with regard to water meadows. He said that he regretted it, for he should lose the greatest value of the surface water, that he had found on the occasion of a storm of rain that it brought down sheep dung and manure of a very valuable quality coming to him from the up land for the irrigation of his low land water meadow. I think there is a great deal of common irrigated meadow, which I have heard of and know, and its value a great deal depends upon receiving the surface washing of the higher grounds; it was sheep land that I referred to, unoccupied as well as occupied.

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6324. I think we all agree that the sewage of Edinburgh is used in an extravagant way, and no attempt is made to take the whole value out of it?—They have extended since I was there the application of it, but still it does run off in a certain condition after passing over a considerable amount of that surface; I did not see there Italian rye grass, but some other they use there.

6325. It is a question of degree?—Yes.

6326. (*Chairman.*) The carriers, I understand, are exceedingly coarse in their construction and very foul in their use?—Yes; I may mention that I was the other day at Worthing, and I made inquiries of the man in charge of the works there; that is a very good specimen of irrigation; the sewage of the town is discharged over a great sieve, but still I believe that after that a considerable amount of manurial matter does go away into the sea to an extent, I think the man said, of double the area of land that might be profitably applied if there was land to apply it to. I am clearly of opinion, from a great deal of evidence, that there is nothing but thorough deep draining that will take out, not entirely and completely, because I know that one of the tests of drainage is the completeness of it, and taking it through, but it will take out more in that way, and the truth is, that a great deal of the fertilizing power of thorough drainage arises from carrying down into the soil those salts of manures that are otherwise washed off from the surface of the soil.

6327. Your point is, if I understand you rightly, that the sewage, when applied to the land, should not only pass over the surface, but that the water should percolate through the soil to the subsoil drains, and after filtration be carried off by them?—Yes; sewage should be allowed to penetrate deep into the soil, irrigation will be complete in proportion to the depth of the system of drains. The art of applying sewage is to give such a dose that nothing of manurial value will go through, and I have often said that Mr. Mechi administers his manures in a blundering way, the test of which is that he says "after all a great deal of manure runs through." I say that instead of dressing his land as he does he ought to give two smaller doses where he gives one, heavy one, he ought to repeat the dose in order to avoid the risk of any portion of it running away, any noticeable portion of it, which is evidence of bad workmanship.

6328. The drains in the one case being a little deeper than in the other in the cases to which you have referred, the little extra depth of soil through which the water percolated caught up the remaining colored matter so that the water from the lower drain ran out, as the man said, like gin?—Yes.

The witness withdrew.

Adjourned till to-morrow at 11 o'clock.

Richmond, Wednesday, 20th December 1865.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., in the Chair.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

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VINCENT GRIFFITHS, Esq. (of Twickenham), examined.

6328. (*Chairman.*) You reside at Twickenham?—Yes.

6329. Is your house near the river?—Within a very short distance of it.

6330. How long have you lived there?—Nine years.

6331. Have you been accustomed to go upon the river?—Almost daily. I am secretary of the Boating Club.

6332. In what condition did you find the water in the river last summer as regards quality and volume?—First, with regard to volume, there has been a very considerable deficiency; the average depth in the channel last summer ranged from a foot to 18 inches below what it used to be; not that the river fell off to that extent all at once, the decrease in volume has been going on for several years; but it has become more marked within the last two years.

6333. (*Mr. Harrison.*) You mean from a foot to 18 inches, not below the water mark of two years ago, but below the water mark of 9 or 10 years ago?—Yes; up to about three or four years ago the heaviest wherry you could put on the river with 8 or 10 persons in it could always go at all times of the tide, from Richmond to Teddington, hugging the Middlesex bank, *i.e.*, up the shallowest part of the river.

6334. Drawing how much water?—About 8 inches; but there certainly was always more than a foot of water; I should say never less than about 18 inches of water under the Middlesex bank for the whole distance. At the present time you cannot approach that bank within a hundred yards with the lightest boat at the lowest point of the tide; you cannot pass between the Middlesex bank and Petersham ait at low water with the lightest boat; you cannot pass between Twickenham ait and the Middlesex shore at the lowest point of the tide with a light boat; you cannot pass between the island immediately above Pope's Grotto at any time after quite high water; all those channels are now shut up, except at high water, and for a short time after high water; during most hours of the day all that navigation is entirely closed even for the lightest boats; opposite General Peel's house, which is perhaps the widest part of the river—Marble Hill is the name of it, and it is about mid-way between here and Twickenham—you may walk across the bed of the river upon slimy ooze for 120 yards at extremely low tides; I do not say that it is so at all low tides, but for the whole distance between the Duke D'Aumale's lawn and Petersham ait, three parts of the river in width are closed, for even light boat navigation, except at high water, and shortly after high water; you must go right over to the other side to get water enough to float your boat.

6335. That, I suppose, is in summer season and in dry weather?—Yes; but even in ordinary weather all that channel is closed for boats; but there is not sufficient water to float them. The river in fact is becoming almost useless for even pleasure traffic in light boats, except with the tide; it is becoming a tidal boating river only.

6336. Between which points do you mean?—Between Richmond and Teddington; but the worst part is between Petersham ait and the Duke D'Aumale's lawn.

6337. Whereabouts is that?—Orleans House is immediately below Twickenham, and Petersham ait is half a mile further down.

6338. What is the character of the river as to the depth in other parts?—Three feet is a fair depth in the very centre of the stream, that is about the average depth, but it ranges as low as 2 feet 6, and in one very

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bad part of the river immediately above Pope's Villa, which is known as Stoney Deep, the deepest part of the water at low tide in a dry season is 18 inches, you can just comfortably walk across by turning up your trousers.

6339. To what causes do you attribute the lessening of the depth of water ?—In the first place to the want of husbandry in dealing with the water, that lies at the bottom of the evil, I mean the rapid way, from improved drainage, in which the water is shot down from the hills and sent into the stream, it comes down with a rush, and in a very short time is gone. If we have heavy rains in summer time, there is a flush of water which we feel, say in about 18 hours, and in a couple of days all that is gone. In the olden days, before drainage was improved, this water lay upon the land, and through springs and small watercourses got into the river gradually, and fed the stream for a long period of time, in fact it never ceased to supply the stream with feeders.

6340. Whence do you think the water is derived that flows down the Thames in the summer, and short water season ?—I should say, from main surface land drainage.

6341. I mean the ordinary summer flow ?—The flow in a dry summer season is, I apprehend, mainly derived from deep springs.

6342. Do you think that any surface agricultural drainage affects those springs ?—Upon that I am not very competent to speak, but I should say it did, by taking off the water from the surface, that would gradually feed them.

6343. (*Chairman.*) Has the pumping out of the river by the water companies had anything to do with lowering the water ?—Certainly; but I believe that the other is the primary and greater evil.

6344. If that is so, as it is quite clear that we cannot undo land drainage, have you thought of any remedy for the evil ?—Husbanding the water, and doing by artificial and engineering processes what was done naturally in olden days—I mean penning up the water in cuts or reservoirs, and letting it out by degrees.

6345. Would putting a lock and weir at a point on the river below have a very beneficial effect ?—A very material effect indeed.

6346. Would dredging the reach do good ?—That would have some effect; but my own observation has not been very favourable to the present mode of dredging.

6347. (*Mr. Harrison.*) Has dredging had any effect in lowering the water ?—It has done as much harm as good I think. Banks that acted usefully as natural weirs have been dredged away entirely; injudicious dredging takes away those natural barriers, and which helped to maintain a certain depth of water above them.

6348. (*Chairman.*) We have been told that there has been a greater abundance of weeds this last year than before; have you noticed that ?—Not last year in particular—but the American weed has been increasing upon us for the last few years.

6349. (*Mr. Harrison.*) Is that increasing in the lower part ?—Yes; but not to the same extent as above. The constant traffic in all the channel parts of the river naturally clears the weeds from the water, so the weed has only an opportunity to grow in the back waters.

6350. You are quite positive about the diminution of water in the bed of the Thames at low water ?—Yes; many of, in fact all, the mansions now upon the Middlesex banks of the river are really unapproachable except at high water. At the first period I can speak to, you might always have reached those houses; but for the last two or three years none of those houses have been approachable except at high water and immediately after it. The boats may be in the boathouses, but you could not possibly get them out, for there is a space varying from 20 to 30, 50 or 60 yards, that you could not pass over. In short, property on the banks of the Thames is deteriorating in value as a residential property.

6351. Can you mention a house from which they are unable to take boats out?—Yes; I will take Little Marble Hill, Mr. Kirby's, just above Petersham ait. I have rowed there hundreds of times and up to four years ago I never found a deficiency of water there. Now it is impossible to approach that house, except for about two hours in the day. They have themselves dredged channels, but those channels very soon silt up and become useless, and it is only by a daily fighting on the part of the residents against the silting up of the river that they can keep a river approach to their houses. The Duke D'Aumale, I believe, went to very considerable expense two years ago to dredge out a channel to his house, which was undergoing the same process of being cut off from the river, and that is true of every house between the points I have spoken of.

6352. (*Chairman.*) Is the river encroaching on the land on the opposite side ?—On the contrary, the banks are growing.

6353-4. On the opposite side ?—Yes, it is not the removal of the water from one space to another, but there is a lessening of the volume of water to an extraordinary degree, the river when I first came here, at low-water was 150 yards wide opposite General Peel's house, it is now only 30 yards wide there. I will give the following fact in evidence of the decrease of the volume of water. In September last we appointed a race to take place; the company assembled, the boats to contest the race were there also, but there was not water enough for one boat fairly to go down, still less for the boats to pass each other. Accordingly we had to go above the lock.

6355. (*Mr. Harrison.*) Was that at low water ?—No, only a few hours after high water. Seven hours short of low water.

6356. You seem to attribute the greater part of the mischief to the upper-land drainage, but do you not know the effect of the extensive dredging which is going on above and below London Bridge ?—As to the effect of the dredging, I hesitate in expressing a positive opinion. With regard to the other point, that is a fact open to the observation of everyone. Formerly after rains, there was a rise in the level of the water which did not pass away for a month or more, now there is a flush of water for a day or two, and then the *status quo ante.*

6357. It does not follow that because the water is very low, impeding the navigation, the quantity of water really passing down has diminished ?—No.

6358. The same quantity in one case may be moving down slowly, and in the other may be moving down rapidly ?—Yes, but that is not the case here; it is a common observation that the amount of the water coming over the weir at Teddington, is less, I cannot say by how many millions of gallons.

6359. (*Professor Way.*) You mean that the regular quantity is less ?—The same quantity comes down during the year, but it comes down by fits and starts with a rush, it is an ordinary regular supply that we have not got.

6360. (*Chairman.*) Have you noticed whether the water is fouler than it used to be ?—Certainly it is.

6361. To what do you attribute that ?—To a double action; the immense increase in the amount of sewage poured into the river, and the immense diminution in the quantity of water for diluting that sewage and carrying it away; those two causes have been acting concurrently. At our boathouse, a point that I see every day through nine months of the year, and frequently in winter, they have recently opened or enlarged a large sewer carrying off the sewage from a brewery and the railway engine houses which used to be turned into the Colne. The sewage is now turned out into low water, almost upon dry ground. It is almost impossible to stand there at low water while the sewage comes out. The boatmen and fishermen often are compelled to retire, although they are not particularly nice, from the offensiveness of the odour. The

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sewage comes down in the back water where there is, even in the centre, very little volume of water. Above that there are other sewers which have been enlarged by the progress of town drainage in the last 10 years.

6362. In the town of Twickenham ?—Yes, all these sewers unite together in the backwater between Wharf lane and the Vicarage, a distance of about 300 yards; the stream of sewage at low water is particularly offensive.

6363. (*Mr. Harrison.*) Is that between the bank and the ait at Twickenham ?—Yes, and there is left upon the bank, a deposit of slime—an offensive blueish mixture, particularly offensive, and which you have to walk through if you go down to the water. Some of the persons living there who are more energetic and more attentive to health than the rest, and who have occasion to go from the bank to the boats daily, wash the bank and clear away the accumulation of sewage. A man named Hall, who keeps a small public house near there, and between whose house and the island there is a ferry, regularly employs a man daily to wash away from the strand the sewage which has accumulated there during the preceding 24 hours. Those persons who are not attentive to the matter do not do that, and there it lies before the houses, this abominable slime that I have spoken of. Concurrently with this increase of the sewage poured into the river at this spot there has been a great increase in the sickness of that neighbourhood, and now that part of Twickenham is certainly a most unhealthy spot. There is nearly always fever and small pox there.

6364. Have you any exact information of that kind that you can give to the Commissioners, or do you know a medical man from Twickenham who could speak to the fact ?—I have no doubt of the fact, but I believe there is a feeling on the part of people at Twickenham to make the case as little black against the parish as they can It is the universal opinion of the fishermen living there that up to about 15 years ago, or up to the cholera year as they call it, that part of Twickenham was not particularly unhealthy, not more so than Teddington or other places by the water side. During the cholera visitation that place was very badly attacked, and from that time to this it has been a pesthouse of sickness. I may state, as a corroborative fact, that we had a collection at the parish church only about three Sundays ago for the relief of families who had recently suffered in that district. Heads of families had been carried off by small pox or other diseases of a very virulent character.

6365. I gather from your statement that the sewage of Twickenham proper accumulates immediately upon the banks of the Thames adjoining Twickenham, and so causes ill health to the inhabitants ?—Yes.

6366. What steps have the inhabitants of Twickenham taken to remove this cause of nuisance and sickness ?—They have appealed, I believe, to the parochial authorities, and individual householders have complained to the inspector of nuisances; and a few weeks ago, a public meeting was held, and the contamination of the river by sewage was one of the subjects referred to a committee appointed at that meeting. The committee consisted of nearly every person of importance in the district, including his Royal Highness the Duke D'Aumale, Lord Willoughby d'Eresby, Lord John Chichester, Mr. Chillingworth, &c.

6367. Has the nuisance of sewage from Twickenham increased of late years ?—It has increased in a very marked degree, and even at a considerable distance from the mouths of the sewers, any person very familiar with the river will notice that the color of the banks, as left by the receding water, is changing, and is becoming of a dirty, slimy hue.

6368. (*Professor Way.*) It is passing from yellow to grey ?—Yes, something like that.

6369. (*Chairman.*) Are there any other matters that you wish to speak to ?—Between the points I have last spoken of fish are very frequently found dead in the punt wells. Every fishing punt has a well in which the live fish are put, and by the construction of the well fresh water passes through and supplies the fish. But the water in the river of late years, unless the punts are put for the night in favorable positions close by the fishermen's cottages, has been so bad that the fish die; this used not to be so.

6370. We have been told that fish congregated at the mouths of sewers ?—Yes, certainly, and nothing feeds them so well, but that may be overdone. Sewage, if they have too much of it, kills them.

The witness withdrew.

Mr. J. Chant.

Mr. JOHN CHANT (of Richmond) examined.

6371. (*Chairman.*) You are relieving officer for the parish of Richmond ?—Yes, of the union.

6372. What amount of relief do you usually pay per week, out-door relief ?—In winter 30*l.*, in summer 20*l.*; the average is about 25*l.*

6373. What are the parts of Richmond in which you are called upon to give most relief ?—New Richmond.

6374. Are the houses and cottages in which you give relief usually sewered and drained ?—There is a sewer there.

6375. Do you find that the same property requires your presence almost continuously ?—No, not so much as that, very frequently.

6376. What is the greatest amount of relief that you have given in the last 12 months to any one family ?—I really cannot tell you.

6377. If a family is down with fever how long does it usually remain on your list for out-door relief ?—A few weeks, two months, or a month.

6378. What amount of relief do you give per week to a family with five or six children ?—That depends upon the certificates I have from the medical gentleman. 5*s.* or 6*s.* or 7*s.* or 10*s.* a week. In one instance 7*s.* were given to an aged couple, and in another instance 7*s.* 6*d.* to a single person. In a few cases as little as 1*s.* 6*d.* or 2*s.* is given. In many cases the people have weekly relief independently; something extra, in consequence of illness.

6379. With regard to that property, was it in a condition that might be made better ?—Yes, by supplying water, and by proper drainage. There may be drainage, but there is no water.

6380. Have you observed the premises to be overcrowded ?—Mostly two or three families live in one house.

6381. What number in one room ?—Sometimes 3 or 4.

6382. Wife, husband, and several children ?—Yes.

6383. In a single room ?—Yes.

6384. When these people become sick the parish have to keep them ?—Yes.

6385. A doctor has to attend them, and you have to give them relief ?—Yes.

6386. If the father dies, what becomes of the wife and children ?—They go to the workhouse, or are supplied with out-door relief.

6387. It does not fall within your province, does it, to report to the guardians upon the bad condition of these houses ?—Yes, at times I do.

6388. What takes place then ?—They give notice to their inspector of nuisances of the parish to endeavour to reduce the nuisance, but the difficulty the inspectors have is this, that they have no sewers in some of the parishes, and no water. In one place there is a cesspool, which has been there for many years, full to the top, there is no sewer nor water to cleanse it with.

6389. What class of persons do those cottages generally belong to ?—Poor men sometimes own two or three of such houses, but the greater number belong to men of large property.

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6390. Men who could afford to improve them if they felt inclined ?—Yes.

6391. The parish go on giving relief for the disease that is generated there, while the person who owns the property pays no attention to it, but gets his rent when he can ?—Yes.

6392. Have you ever known the money that you have given for relief taken for the rent ?—I never pay any for rent.

6393. Have you reason to believe that as soon as your back is turned there is some person who takes for the rent the money given for relief ?—That is very likely.

6394. In such cases the parish pays for the relief of sickness, and the rents of the tenements that cause it ?—Yes, I expect it is so in the aggregate.

6395. (*Mr. Harrison.*) You say there are cesspools in some of the parishes ?—At Petersham parish there is no sewer, only common cesspools, which it is impossible to flush. At Kew it is the same. When I say no sewer, there is a very trifling sewer which takes merely the land water, but not the top water from the closets. At Mortlake there is a sewer, but that only partially answers the purpose, some parts of Mortlake are very bad. Barnes has no sewer, I may say, there is indeed a sewer in the street for 150 yards, which was made about 35 years ago, merely to take the water off the highway; upon that sewer there are some closets that take the top water in. The sewer empties itself by the side of the terrace into the river in low water, close to the surface.

6396. (*Chairman.*) Do the poor people ever complain to you about the nuisances ?—They complain about the nuisances more to the inspectors, not often to me.

6397. When you give relief do you go inside the rooms where the poor live ?—I often visit the poor in that way.

6398. Is that a pleasant or disagreeable duty ?—Very disagreeable in some parts.

6399. Are they very confined places ?—Yes.

6400. I suppose the walls are very dirty, and the windows will not open ?—It is not so much that, the houses are certainly dirty, and the tenants generally speaking are not very clean, but the worst thing is the drainage and the water.

6401. Do you wonder that there is disease there ?—Not at all.

6402. I suppose you would be surprised if there was not ?—Certainly; I wonder that there is not more than there is.

6403. Your whole life consists in going about and supplying money to poor people that are brought into this wretched state in these bad houses ?—Yes, and I have been doing so for 40 years.

6404. What water supply have they, are they supplied by companies ?—The water is laid on now from Barnes and Mortlake, but there are very few of the poor who have it laid on, the poor cannot afford to have it laid on.

6405. They cannot treat with a company, and if the landlord does not do it they go without ?—Yes.

6406. Where do they get water from ?—They go and fetch it from pumps; one pump supplies probably 50 houses.

6407. And beg it from neighbours ?—Yes.

6408. (*Mr. Harrison.*) Is that the case in Richmond ?—Richmond is not so badly supplied.

6409. Is Richmond generally supplied by water companies ?—Yes, generally, but not sufficiently I should say, Richmond is only a pleasure town. In Richmond there must be a large number of houses of a poor class that require water to be laid on.

6410. Are there many cesspools in Richmond in the lower part of the town ?—I have no doubt there are many to be found.

The witness withdrew.

AUGUSTUS K. MAYBURY, Esq., M.D. (of Richmond), examined.

A. K. Maybury, Esq., M.D.

6411. (*Chairman.*) You practise in Richmond ?—Yes.

6412. Did you hear the evidence given by Mr. Chant as to the dwellings of the poor ?—I did.

6413. Can you verify his statement as to the condition they are in ?—To the entire extent, and I think I may add that the great fault is the privies, which are most defective in this locality. There are pans without any means of flushing, the water in very many cases not being laid on at all. The people themselves, particularly those not of cleanly habits, neglect entirely to flush them. The pans are constructed with the idea that the occupiers will flush them, but they do not do it; they do not even put covers on them, nor shut the privy doors. There may happen to be a wall surrounding it stopping the escape of the smell, a horrid effluvium is thus conducted into the house, and is very often attended with most injurious effects.

6414. Have you ever witnessed the overcrowding that Mr. Chant has spoken of ?—Yes.

6415. Such as a single family occupying but one room in a tenement ?—Yes, and of small dimensions.

6416. In that if fever breaks out among them, healthy and sick are all crowded together ?—Necessarily.

6417. And then follows possibly the loss of the head of the family ?—Yes, and if to sickness is superadded intemperance and extreme poverty, of course the effects are very bad indeed.

6418. To what class of persons is typhus fever most fatal ?—To those who are in want, and intemperate. But supposing the poor in such houses do not take the fever, their health is considerably lowered, and they have not the same amount of energy that they would have if they had good food and ventilation and other accessories to a good state of existence.

6419. I suppose you regard intemperance as proceeding in some measure from the bad conditions in which the men are living ?—Very possibly it is so.

6420. If they could have more comforts there might be less intemperance ?—No doubt of it.

6421. You heard the relieving officer state that parish money was being continually absorbed by this very class of property ?—Yes.

6422. So that the parish is paying directly for the support of property which produces sickness and a necessity for relief ?—Yes, all of which might be prevented if the owners did their duty.

6423. Or if the parish authorities had power to do something to put an end to such a state of things ?—Yes, or if the medical officers were armed with authority and with legal power to enforce proper sanitary regulations.

6424. If in one of these places there was a family of six or seven, the head of it down with typhus fever and all the family suffering more or less, and the father died, the widow and her children would go to the workhouse, then another healthy family might take their places in the same tenement, and I suppose you could predict the same result ?—Yes, under the same circumstances, but we do not allow the same circumstances to exist here, we endeavour to remove the cause. In various parts of London what you have said is true to the fullest extent, but people are better off here in the main than in other places.

6425. You mean in Richmond itself ?—The whole town.

6426. Do you know Petersham, Kew, Mortlake, and Barnes ?—Petersham and Kew.

6427. Are they better off there ?—The drainage of those places is very bad, and the sewage, but they are well-to-do people there, for the most part, and the population is small.

6428. With regard to the type of fever which is so destructive to health, and so costly to the parish, do

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you think, that in the main it proceeds from overcrowding, deficient drainage, bad water supply, improvident habits, poverty, and intemperance?—Yes.

6429. If all those conditions could be removed would you expect that type of disease in a great degree to vanish?—Most decidedly, there is no doubt of it.

6430. I suppose you were acquainted with the condition of the gaols in this country before Howard made his examination of them?—To some extent.

6431. There was a type of disease which was simply typhus aggravated, and known as gaol fever, but you are probably aware that if a fatal case of fever occurred in a gaol now, there would be an inquest held, and the governor would be examined?—Yes, I am aware that great improvements have been effected in respect of health of prisoners in gaols.

6432. And yet the inmates of those gaols are the very people who are taken from these poor tenements?—Yes.

6433. Are there any other points upon which you wish to give evidence?—The drainage in some parts of the town is very faulty; not the main drainage, but the branch drainage from the poor tenements. The privies and the pan arrangements are extremely faulty and mischievous, and overcrowding, of course, produces its effects. These, I think, are the main points.

6434. Is the river much fouled by discharge of sewage?—There is no doubt of it. I heard the evidence of Mr. Vincent Griffiths, and I can bear out all he said upon that point. Whenever the sewage is taken into the river there is a black deposit, which remains exposed to the sun's rays for many hours. I also agree with all I heard of his evidence as to the diminution of the volume of water in the Thames. For nearly 10 years I have observed it.

6435. (*Mr. Harrison.*) Do you find that the same disease which is engendered in the low parts of the town where there is bad sewerage and a want of water, also affects the health of those living in the more healthy parts of the town?—Yes.

6436. So that they are not merely out of pocket by having to contribute relief, but they suffer personally?—There is no doubt of it at all.

The witness withdrew.

W. Chillingworth, Esq.

WILLIAM CHILLINGWORTH, Esq. (of Twickenham), examined.

6437. (*Chairman.*) You reside at Twickenham?—Yes.

6438. On the banks of the Thames?—Yes.

6439. How long have you resided there?—20 years.

6440. Have you observed the Thames during that period?—Yes, particularly; I cannot help it, for my sitting room is immediately at the river side.

6441. Has the condition of the Thames become altered in any way during that time for better or worse?—It is much worse.

6442. In what respects?—Particularly in the quantity of water; there is a smaller volume.

6443. What do you say as to its purity?—It is not improved certainly.

6444. Is it worse than it was?—Yes.

6445. Did you hear Mr. Vincent Griffiths give his evidence?—Yes, I think I did the principal part of it.

6446. Did you or not agree with the portion of it that you heard?—Almost entirely.

6447. As to the fouling of the river, the diminished volume of the water, and the difficulty of boating?—I agree entirely as to those.

6448. And as to the foul state of the banks at low water, which are covered by a foul slimy deposit?—Yes, there is no doubt of that.

6449. You signed, I believe, the memorial to the conservators of the river Thames, which I hold in my hand, calling upon them to do certain things in the river for its improvement?—Yes.

6450. Do you believe that the river would be improved by putting a lock and weir at a point down the river as specified in this memorial?—Yes, somewhere near Isleworth. I have taken rather an active part in this matter with some of the principal inhabitants of Twickenham. I have known the river from a boy, and have always been very fond of it, from having navigated it in yachts and boats. I know it, not only above bridge, but below bridge also; and from the observations I have made I know the absolute necessity, not only of obtaining more water here, but of retaining a portion of it by means of a lock and a weir. It is for want of those that almost all the mischief arises. We want water to cover the mouths of the drains and the mud banks. Without a lock and a weir it is my conviction that you will never do any good.

6451–2. I suppose that you, as a riparian proprietor, contemplate having something to pay for any work that may be done to improve the river and the adjacent property?—If it came in the shape of a rate I should have no objection to it.

6453. If it is an equitable rate distributed over all the property benefited by the improvements you would not object?—I would even contribute more than that. The work is so necessary to those residing on the banks of the river that in whatever way it is done, I shall be happy to pay my quota, whether it be small or large.

6454. (*Professor Way.*) The property to be so rated would be very large?—Yes; with a moderate rate, the amount raised would be very large, for very extensive property would be benefited. I am convinced of that from having seen the letters that were received by the committee from persons who were not present, but who authorized the vicar and the secretary to put their names down for almost any sum. The Duke D'Aumale, and many of the inhabitants, said, "Put "my name down for any amount you think right, "this state of things must be remedied."

6455. (*Chairman.*) Your view, as a riparian proprietor, would be that the conservators, if they have not legal power to do what is required, should arm themselves with legal powers, and devise some plan to remedy the evil, carry it out, and levy a rate to meet the expense?—Yes, no doubt.

6456. If they could borrow the money to be repaid in 30 years, the rate that it would be necessary to levy would be a very light one?—Yes, I think so.

6457. Have you any other facts to add?—The navigation for craft coming up and down the river for commercial purposes is very much impeded. I mean barges which navigate the river for trade—half a dozen barges are frequently detained opposite my house for one and two tides. I have known them to be there for a week. I remember an instance that occurred last summer of a barge being detained, and the family on board it were very nearly starved for want of money, when I sent them some assistance. Things are really much worse than people imagine, and many of the gentlemen on the Conservancy Board are not aware of what I am—they are not there night and day—but I reside there winter and summer, and see all about it.

6458. (*Mr. Harrison.*) From what you stated just now, you wish, I presume, to keep the water up high enough to cover the mouths of the sewers?—Yes; they have been lengthened as much as they possibly could be, and yet they are above the level of the Thames in the summer.

6459. Do you contemplate perpetuating the sewers which run into the river?—The less the better of course; but Twickenham is in a very awkward position; it lies very low, and there would be many difficulties in draining it elsewhere than into the river.

6460. If a weir was erected in the direction of Isleworth, would you not form a pond between Teddington and Isleworth with a very slow stream?—No; I think not, judging from what we see between other locks. There has been I believe an outcry about the state of the river at the head of Teddington weir; but really I have perceived very little mischief there.

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6461. (*Chairman.*) If the Conservancy Board in obtaining power to erect a lock and a weir also sought to acquire power to construct a main sewer to take the sewage from the whole district and deal with it in some way, so that it should not be a nuisance, would you fall into such a proposition?—Yes; I think so.

6462. Always bearing in mind that it would be a moderate rate, and that it would add value to the property?—Certainly.

6463. If you expended 20*l.* in taking away for ever the sewage from your house, would not that give a value to the property which it has not now?—Yes; if it was possible, but I do not see how that is to be done, for we lie very low. But if it can be done, everybody would be very glad to have it done. The difference in the height of the water now and 11 or 12 years ago is certainly 2 feet 6 inches, taking the same time of the year, and an average of the different depths of the water about Twickenham.

6464. (*Mr. Harrison.*) Is there any difference between the level at your house of a spring high-water now and a spring high-water level at your house 20 years ago?—No; I think it is the same.

6465. And the same at neaps?—Probably the same at neaps.

6466. How long is it since Teddington lock was erected?—Long before my time, perhaps 60 years ago, but we have had a new one built lately.

The witness withdrew.

Mr. William Linley (of Ham Common) examined.

Mr. W. Linley.

6467. (*Chairman.*) Do you reside at Ham Common?—Yes.

6468. Has not Ham Common been recently sewered?—One part of it.

6469. Not the part where you reside?—No, I reside near the park gate—the next house but one.

6470. Does not the sewer go down past your house?—No, there is what is called a river, which does not flow, and that is what I wish to speak about.

6471. What do you think can be done with it?—Nothing, but altering the levels. I think that from cleaning it out at various times it has been hollowed too low, so that the water stands in it too much.

6472. It is stagnant now?—Yes, and always is so except when full.

6473. Is it a nuisance?—Yes.

6474. Have you complained of it to the conservators?—I have taken no active part about it.

6475. Is there a local board of health in your parish?—There may be. After flowing by my house and Mr. Barnard, the banker's, the river then goes into Government property through Petersham park, and of course if it does not flow there it cannot get away from us.

The witness withdrew.

Mr. William Henry Doust (of Teddington Lock) examined.

Mr. W. H. Doust.

6476. (*Chairman.*) Are you the keeper of Teddington lock?—Yes.

6477. Who appointed you?—The Honorable Board of Conservancy.

6478. How long have you been keeper of that lock?—About 16 months.

6479. Is there much traffic carried on through that lock?—It has improved a great deal during the last 12 months.

6480. What number of boats do you generally pass through per day?—The number varies—sometimes 14 or 15, at other times 10 or less than 10.

6481. Of what tonnage are those barges generally?—They vary; on the average 60 or 70 tons.

6482. Have they any difficulty in getting away?—Not particular; only once since I have been there have they required a flash.

6483. Have you heard that boats have been sometimes aground opposite Twickenham for a week, and that people have been nearly starved to death?—There was one boat that came out of Brentford dock about six months ago. By some mistake or other she got out of the channel and came in right on to the main. I believe she lay there for a time, and some of the gentlemen living opposite were kind enough to send some food to the people.

6484. (*Mr. Harrison.*) With a falling tide a vessel so circumstanced might be left there till the next spring?—Yes, if she got there at the top of the springs she must wait till the springs came in again.

6485. (*Chairman.*) Does the tide ever pass over Teddington weir?—From low water to high water it has risen 6 feet 10 inches perpendicular.

6486. How near to the level of the weir would that be?—It must have been level there, as the gates were open for 10 minutes. I was not at the weir to see.

6487. What depth of water have you usually passing over the weir?—The weir has always water running over it. I have seen the bay dry, but the shutters were in; they appeared four or five inches over the stone work, but if they had not been in the water would have run over the bays.

6488. (*Mr. Harrison.*) Have you ever known when a man might walk along the bays without getting over his shoes?—The shutters hold the water back and stop it; if they were drawn it would run over, and a man must wet his feet.

6489. (*Chairman.*) You do not know whether the water is falling off in depth in dry weather?—Last year it was lower at the lower gates than was ever known, according to Mr. Leach's statement.

6490. Do you mean compared with what it was 10 or 12 years ago?—Yes, and further back than that. I must say that on the day we had 6 feet 10 inches rise the low-water gauge was 10 feet 3 inches.

6491. You never found any nuisance from the smell of the water?—Never. Sometimes I see a little scum on the water, generally after a foggy night; of course it is very heavy water but there is not any sewage that I can see.

6492. What is the size of Teddington lock?—175 feet long and 25 feet wide.

6493. What is the depth on the sill below?—At low water the lowest depth ever known was 10 feet 1 inch on the sill.

6494. (*Mr. Harrison.*) You have a boat lock by the side of the barge lock?—Yes, about 52 feet long; we pass small boats through it.

6495. Do you take any toll?—No, little boats are free.

6496. (*Professor Way.*) Do you know the nature of the bottom of the stream above the lock, or have you seen polls pushed into it. I have not seen any used.

6497. You do not know whether there is a collection of mud above the lock?—No.

6498. (*Chairman.*) Have you anything further to add?—I suppose I might say that, for this year, over 3,250 barges have passed through Teddington lock, *i.e.* 300 more barges than passed through in 1864.

6499. Is that in consequence, do you suppose, of the increase of dredging that is going on below?—I suppose the traffic gets greater. The coals come by railway to Brentford, and thence to Ditton and elsewhere.

6500. What was the gross number of boats which passed through the lock last year?—About 2,910, and there will be an increase of over 300 upon that in 1865. The greatest increase is between Teddington lock and Moulsey lock.

6501. The increase has not arisen from the traffic above Moulsey?—Yes, it has improved above, but more so below the lock.

The witness withdrew.

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Mr. H. Hunt.

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Mr. Henry Hunt (of Richmond) examined.

6502. (*Chairman.*) What are you?—I am a reporter to the "County Chronicle."

6503. Where do you reside?—At Richmond.

6504. What length of time have you resided there? I have been in this locality for about 30 years. I have resided in the parish of Richmond for some 15 years.

6505. Do you know the Thames?—Yes.

6506. Have you observed any alteration in the Thames during the last 10 or 12 years?—Very much. The water is a considerable deal lower now than it was.

6507. How have you arrived at that conclusion?—From observation—from merely looking at it.

6508. You have not taken any measurements or gaugings?—No.

6509. Have you noticed the condition of the water? —It is decidedly not so pure as it was.

6510. Have you heard any remedies suggested for this state of things?—I have heard of a scheme to take the sewage from the river Thames, and use it for agricultural purposes.

6511. Have you had anything to do with it yourself? —Yes; I have referenced the ground from Brentford through Ealing parish, Heston, Cranford, and so on to Harmondsworth where is the place proposed to receive the sewage. The sewage is proposed to be taken from Richmond, at the mouth of the sewer, by means of a conduit across the river Thames into the parish of Isleworth to a place near to Wharton Lane. There it is to be met by another sewer carrying the sewage from the parish of Ealing, in the premises owned or occupied by Mrs. Montgomery, a timber merchant.

6512. In registering the owners in your reference book did you find any opposition to what was proposed to be done?—I heard the practical farmers speak very highly of it.

6513. Did they lead you to believe that if the sewage was brought within their reach they would avail themselves of it?—Yes.

6514. (*Mr. Harrison.*) Where is this sewage ultimately to be taken to?—To Harmondsworth, the whole of the sewage from Richmond, Twickenham, Isleworth, and Brentford, is proposed to be taken.

6515. (*Chairman.*) The whole of the proposals are scheduled in the parliamentary notice, and the plans have been deposited this autumn?—Yes, by Messrs. Hargrove, Fowler, and Blunt, of Victoria Street. The bill is called "The Thames Purification Bill."

6516. Will land be purchased for the distribution of the sewage, or will they sell the stuff to the farmers? —I understand that they will supply it to the farmers. If one would not take it they would supply it to another.

6517. (*Professor Way.*) Did you say that the Kingston was included in the Thames Purification Bill?—Yes, so is Windsor, and towns up to Reading and Oxford.

6518. (*Chairman.*) For the whole of this scheme you know that the ground has been surveyed, plans deposited, notices given, and application is to be made to Parliament in the next session?—Yes.

6519. (*Mr. Harrison*). Did you say that steamboats are prevented coming to Richmond as freely as they used to do?—They cannot get up. I have seen them aground, and barges too. There used to be a considerable deal of traffic by steamboats to different places up the river.

(*Mr. Chapman.*) I have seen as many as seven steamers up in a day—all seven aground together.

6520–1. Where is the point below Richmond to which steamers can come now?—They can get to Kew, and there they stop. I have not the slightest hesitation in saying that if we had more water at Richmond we should have a large number of persons coming up on excursion trips by the river.

6522. (*Mr. Way.*) When did the traffic to Richmond by steamers cease?—Some 10 years ago.

The witness withdrew.

Mr. J. Barnes.

Mr. Joseph Barnes (of Richmond) examined.

6523. (*Chairman.*) What are you? — A barge carman. I horse barges up the river from Putney to Richmond, or further.

6524. How long have you been engaged in that business?—About three years, and my uncle before me had it for about 60 years.

6525. How long have you been acquainted with it? —For about eight years.

6526. Do you find any more difficulty in towing barges up and down than you did formerly?—Yes, a great deal more.

6527. Is that in consequence of the lowness of the water?—Yes, the barges get aground so often.

6528. Are the banks more crooked?—Yes, the banks are more washed away, particularly about Mortlake.

6530. Are floods now the same as formerly?—Yes.

6531. And as great?—Yes, last winter there were some very high floods.

6532. Did they last so long?—No.

6533. In dry weather have you less water than you used to have?—Yes.

6534. What is that owing to?—I cannot say; but we are very short of water about Mortlake, Kew, and Richmond.

6535. Do you think the water companies pump it away?—Very likely—that must have something to do with it. Close to Kew Bridge you can walk across the river in summer time with a pair of Wellington boots on. We frequently have a barge aground now, and that causes a delay of four or five hours, and sometimes of three or four days.

6536. You could not walk across the river when you first knew it?—No.

6537. (*Mr. Harrison.*) Has the diminution of the water been gradual?—Yes.

6538. How many years have you observed that?—For the last three or four years.

6539. (*Chairman.*) What cargoes do barges principally carry, coals?—Yes, and timber, also oil and gunpowder, and something of every description.

6540. Do you think that if the Thames were put into a better condition there would be a large increase of traffic?—Most decidedly, more particularly in coals from the pool to Guildford, Weybridge, Reading, and those places.

6541. Do you think, notwithstanding the railways, that if the river could afford sufficient accommodation there would be a very considerable traffic up the river?—Yes, more than there is now.

6542. What is the greatest weight barges carry?—80 tons is about the heaviest, or 90 tons; a 90 ton barge can go up.

6543. What depth of water do they draw?—About four feet, but that depends upon how they are built. The cut barges are built differently from the other barges.

(*Mr. Doust.*) I have had one drawing as much as five feet go up, and I think she had about 80 tons.

6544. (*Professor Way.*) Have any barges been built lately?—Yes.

6545. Are they built of less draught than they used to be?—I fancy they are.

6546. (*Mr. Harrison.*) This dimunition in the depth of the water is not merely above Isleworth, but it extends down as far as Kew does it not?—Yes, and further down than Kew.

6547. So that if a lock and a weir were erected at Isleworth, that would not affect the water at Kew?—No, Isleworth would not be low enough down; Kew would be shorter of water then than it is now.

6548. Then the next step would be an application

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to the conservators to put up a weir and a lock lower down?—Yes. Oftentimes the tide is very short at Kew.

6549. How far have you been in the habit of towing barges?—As far as Reading, and to Oxford, when they go up swan-hopping.

6550. Do you find much difficulty in the upper reaches of the river as to the depth of water?—No, we get on very well after we get through Teddington lock. It is below Teddington lock where we feel the difficulty. A barge last night got aground at Richmond, and there she is now; she will have to wait till to-day. She might get away to-day by chance.

6551. Why should a barge remain two or three days?—Sometimes in the morning the tide is high, and at night very low.

6552. (*Chairman.*) I suppose the tide is influenced by the state of the wind?—Yes, it goes by the wind. One day last week we had a very high tide, and then for four or five tides perhaps not enough to float a barge.

6553. (*Professor Way.*) Have you noticed any change in the condition of the river, as to its cleanness?—Yes, it has been very filthy and muddy in the last few years.

6554. Is that bad condition increasing?—Yes; at Mortlake and Barnes we feel it very much.

6555. Is it offensive to the smell?—Yes, very much so indeed.

6556. (*Mr. Harrison.*) These places, I believe, are below Isleworth, where it is proposed to erect a weir?—Yes.

6557–8. So that the nuisance you speak of would not be remedied?—No, not about Mortlake and Barnes. I should think that Chiswick would be a very good place for another weir.

The witness withdrew.

H. G. Bohn, Esq.

Henry George Bohn, Esq. (of North End House, Twickenham), examined.

6559. (*Chairman.*) Do you reside in Twickenham on the banks of the Thames?—Not exactly on the banks, a few hundred feet away, opposite Montpelier Road, nearly opposite General Peel's house.

6560. The memorial which I hold in my hand, you are of course well acquainted with?—Yes, perfectly, because I wrote it, being honorary secretary to the committee.

6561. How long have you known the Thames?—I have resided there 16 years, and have known the Thames from my boyhood.

6552. Have you paid sufficient attention to the Thames to have formed any opinion as to whether there has been any alteration in its condition?—It seems to me that there has been a very considerable alteration since I boated on it, certainly, for I recollect how the water used to come up even at low water to Twickenham.

6563. In purity do you think there is any difference?—Yes, so great a difference that there is now no purity in the river at all, it is terrible now, you may stand on the bridge and see the scum come up from London; it sometimes seems thick enough to walk upon.

6564. Would you agree with any scheme which would keep the sewage out of the Thames?—Most certainly, I should not only agree to it, but should be glad to subscribe, not so much for my own benefit as for that of my fellow creatures. The present state of things is monstrous.

6565. You think, and those who with you signed this memorial think, that to place a new weir in the river, and to make a new reach, or, as we engineers call it, a new pond, similar to the one above Teddington lock, would be the best form of improvement for that part of the river?—Yes, and being tolerably familiar with most of the gentry from Teddington down to Isleworth, I think I may say that there is not a dissentient voice as to the merits of a lock in that position. On the contrary, I believe they would not only strongly advocate it, but subscribe to it, and I have reason to believe that the Duke of Northumberland would give the necessary land upon his meadow for a weir.

6566. In the event of the construction of a new lock, should you propose to take tolls for passing through it?—I should propose to get some Government grant, to prevent the necessity of taking tolls. Taking tolls there would increase the burden of barge masters, although not very considerably, if the lock was above Brentford; if it was below Brentford I am quite sure that they would not have tolls, there would be a general appeal against such an impost.

6567. Then you would rather have a free lock than a toll lock?—Yes, and if the lock could not be quite free I would ask for a very moderate toll upon it, much more moderate than is usual with other locks. I would also ask for a toll to be put upon the boats. The members of our boat club are quite willing to pay a toll; they now pay more by voluntary gifts than they would by tolls. I am quite sure you would have six pleasure boats for one which you have now, if a reach was created.

6568. What would be the effect of a new lock upon the fishing?—I am on the council of the Thames Angling Preservation Society, and we all feel strongly that if we had sufficient water between Brentford and Teddington, we should have a large increase of fish. If you give us that lock for three years, I will undertake to say that you shall catch fish wherever you throw in a line.

6569. Have you, as connected with the Thames Angling Society, had anything to do with stocking the river with spawn?—Yes, a great deal.

6570. Have you reason to believe that it is has been attended with success?—Very considerable success; but we are so infested with poachers that, unless we can employ our four watchers, which we have asked permission of the Thames Conservancy to do, the spawn is all killed in the shape of young fish, almost as fast as it arrives at any condition.

6571. Have you noticed whether the foul state of the river is at all injurious to the spawn?—That is a point at which we have not yet arrived. When the sewage deposited becomes decomposed, and emits gases, of course the foul state of the river poisons the fish. Within the last few months the fish below Kew Bridge were extensively poisoned. I know that after a drought, when the water is so low that the mouths of the sewers are not washed by the current, decomposition commences, and then freshes take up the gases and the fish are suddenly poisoned.

6572. Some fish in the Thames spawn on gravel, and some attach their spawn to weeds and branches?—Yes, and oyster shells. It is chiefly trout and salmon which spawn upon the gravel; the question of salmon may be at a long distance, but we very soon hope to have an abundance of trout in the Thames, if fair play is given to us. We shall very soon find the money.

6573. I have heard it said that spawn attached to weeds is poisoned by the coating of the sewage scum in the Thames?—There is no doubt that whenever sewage is deposited upon the spawn the spawn is poisoned.

6574. Do swans interfere much with the spawn?—Not so much as people suppose, but there is no doubt that they feed upon the spawn, if they can get at it.

6575. Are there any special points upon this inquiry which you wish to bring to the notice of the Commission?—A gentleman of great influence has written me a note this morning to ask whether, when you were at Kingston, you had ascertained that one or more than one of the companies was in the habit of feeding one of the canals.

6576. I believe that any member of parliament can move in the House of Commons for a return from the

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water companies as to the volume of water which they take, and the uses which they put it to?—That would elicit the facts. I myself could not separate the accounts, but it came out at last that the companies pay 300*l.* a year each for the water, except that one of them pays only 200*l.* a year.

6577. (*Mr. Harrison.*) Mr. Simpson told us that the water companies were authorized by their Acts of Parliament to draw from the Thames in the aggregate 100,000,000 gallons a day, and that he did not think they drew very much more than 60,000,000?—I have taxed them up to 73,000,000 by looking at the register, which I understand very well.

6578. That left a large margin?—Yes, but that was just when the rains were coming on. If you judge by this, what will be required in the height of drought, and by a very largely increased population, you will find that in two or three years they will want the whole 100,000,000 and more, and 100,000,000 will be too much for us. As it is the water is very deficient between Teddington and Richmond Bridge; little boys scarcely condescend to pull up their trousers in crossing it. Again, in shallow water the effect of the sewage is greatly aggravated; in a large body of water the impurities would not be so great.

6579. (*Chairman.*) Do you know that the East London Water Company take their water from the River Lee Commissioners and pay a large rent for the privilege?—Yes.

6580. If the five companies each paid 5,000*l.* a year for the water which they take from the Thames you might do an enormous deal to the Thames with that money?—Yes; if you remove the sewage from the river it will be as grand a thing as any works of the ancient Romans.

6581. If the Thames Conservators are to lay out large sums for improving the river which will benefit the consumers of water and benefit the companies, it would not be a very great hardship to ask the companies for an increased payment, which they might or might not levy upon their consumers?—It would be very equitable. I take three supplies from the company for my premises, and I should be very willing to pay half as much again as I do if the company thought it necessary in consequence of being taxed. Water is very cheap now, and pure water is very important. A gentleman who cannot come here tells me that the impurity of the river has caused great mischief about Twickenham, that at the back of the main street small pox is prevailing extensively, and that there are some evidences of scarlet fever. Down in the low parts among the cottages he attributes that in some degree to the impurity of the water and to the stenches.

6582. Do you know anything of the river above you?—I know it at Teddington and I know it at Hampton. There it is very superior to what it is here, but it is not so pure as it ought to be. I believe that there are between 800,000 and 1,000,000 inhabitants who pour their filth into our watershed, which certainly ought to be put an end to.

6583. Does the land which has a river frontage command a better price?—The river frontage commands a large price with people who are fond of boating. River frontage in our neighbourhood which used to be worth 500*l.* an acre is now worth 1,000*l.* an acre.

6584. That value will be increased or diminished in proportion as the river is in a better or worse condition?—Not to any material extent. Houses on the river bank have risen in value. I have heard it said that a tax might be levied upon the people on the river side. I think not, because the great benefit of the Thames being purified and the water being raised is not alone to people residing there. A good deal of the land belongs to Government, a good deal to the Duke of Northumberland, and some to General Peel, and it is not occupied by houses, and you would get comparatively nothing by a tax upon riparian properties.

6585. Why should you not tax the land belonging to the Government as you would that belonging to any private individual?—I have no objection to the Government being taxed, but you would not get much out of the tax. We want pure water to drink, as well as for boats and for fish.

6586. You want the river improved, which would benefit the persons owning frontages?—It would benefit the frontages to a certain extent.

6587. You did not hear the evidence which was given this morning, that the water had altered so very much in the river opposite the property which you are now speaking of, that whereas some few years ago it was very easy to land out of a boat or to get into a boat, now, excepting for a short time a little before and a little after high water, such a thing is impracticable?—That is so notorious that I did not know that you even asked for it in evidence. Everybody knows that from Teddington down to Brentford the water is lower, and that the boatmen who used to land at Isleworth now find a mud bank of three or four feet between them and the landing place. That is most likely a silting up of the river in consequence of the enormous quantity of manure which has been heaped into it.

6588. And many of these proprietors have had to keep a channel from their own properties down to the water?—Yes, if you do not clear away the shoals the river will silt up. You, as an engineer, must know that very well without any evidence.

6589. Surely if you alter that state of things it is not unreasonable that the properties benefited should bear a proportion of the cost?—I think that they would most willingly contribute. I do not live immediately on the banks of the Thames; although close to it, I am not affected, and therefore I speak disinterestedly when I say, that I do not think that a few hundred houses which you might tax for such an object, should be taken into consideration.

6590. They would not be a few hundred houses. If you are to improve the Thames, you must take the river frontage all the way more or less, and there you must extend your taxation over that whole area?—We only want a lock at Isleworth, and therefore we are on the question between Teddington and Isleworth.

(*Mr. Chadwick*). From a slight knowledge I should say that the increasing perception of the unwholesome condition along the river bank will deteriorate property. People to my knowledge, who have taken residences on the side of the river with a very picturesque aspect, say that they will not take them again.

(*Mr. Bohn.*) The lock would cost 25,000*l.* I believe that we could raise 5,000*l.* in Twickenham rather than not have the lock; but I think it ought to be a boon given us by the Government. It would be injudicious to tax people because they occupy an agreeable site.

6591. (*Professor Way.*) But are you willing to take the benefit of the taxation of other people?—The Government should refund some of the money which they take. This year they have had 8,000*l.* from the Thames Conservators. They take a third from the fines, a third from the water companies, and a third from the money produce of the ballast now dredging for the Thames Embankment. I believe that upwards of 30,000*l.* has been obtained this year for ballast dredging by the Thames Conservators, and of this sum Government takes one-third. I think that Government should step forward for the most national concern which they have. The Thames stands second to nothing in the country.

6592. Supposing that the effect of the improvement which you suggest was that the property in this neighbourhood for some distance on each bank of the Thames was increased in value, would it not be a fair thing to tax that property for that improvement?—I should be opposed to it if I were in parliament, which I am not. I should think it unfair to tax a few individuals for the public benefit. I wish a public benefit to be paid for by the public.

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6593. You have spoken about the revenue to be derived from boats; have you any notion of what number of boats would pass a weir such as you propose?—At present the boating produces something like 100*l.* or 150*l.* a year to the lock-keepers. I believe that paid tolls from boats passing the new proposed dock would bring 200*l.* or 300*l.* a year.

6594. (*Chairman.*) Three hundred pounds a year at 3 per cent. would represent nearly 10,000*l.*?—Yes; but I think that the water companies ought to help pay for this lock, as they are a principal cause of our application for it.

6595. Is there anything further which you wish to state?—There is only one thing. One of your principal investigations, I believe, is with regard to the pollution of the Thames, and how it can be prevented. In Twickenham we have in the last few years cleansed the road by putting a pipe in the place of a ditch, and that pipe is now made the common meeting place of all the drains. They take the surface water, which is almost as foul as the sewage itself, from all the houses along the road excepting mine, and my house is drained into my cesspools.

6596. Do you utilize the whole of your refuse?—Yes. My grounds are rather large, and they are managed upon a novel principle. I have three cesspools well cemented in, and a force-pump to each. Every Saturday morning we take off the water and throw it on to the ground, which produces good vegetables—celery, cabbages, and so forth. The substantial part of the sewage we remove once a year and bury it for use, and I will undertake to say that my house is as sweet as any house in the kingdom. We trap carefully, and we never have any gases through the traps. When I came into my house it was very different; we constantly had smells. If all houses could be drained in that way we should not be troubled with the sewage of the Thames, but not everybody has seven acres of ground.

6597. And it is not everybody that has seven acres of ground who has the intelligence and the perseverance to do what is right with it?—That is very true. I suppose that you are aware that barges employed to clear away mud sometimes open their bottoms and let the mud out again into the Thames. When you have got rid of the known causes of the pollution of the Thames you will have many more, but the difficulty can be overcome by rigid examination.

6598. (*Mr. Harrison.*) Will you enumerate the sources of pollution?—Soap works, gas works, and paper works. I speak only from general information. Then canals silt up at the mouths, and we know that every now and then they are flushed into the Thames. At Brentford, for instance, a great bank formerly existed at the mouth of the canal; it was cleared away a few years ago, and now there is a shoal on the other side of the river. Such things are familiar to everybody who has been up and down the Thames, as I have.

6599. (*Professor Way.*) Have you any soap works at Twickenham?—Not at Twickenham, but there are some at Isleworth. There are breweries at Twickenham and a paper manufactory.

6600. (*Mr. Harrison.*) Did you hear the evidence given this morning that the diminution in the depth of the water is not peculiar to the neighbourhood of Twickenham and Richmond, but that it extends down even as low as Kew?—It does.

6601. If the conservators acceded to your request, and erected a weir and a pound lock above Brentford, would they not in all probability soon be applied to for the erection of a similar weir lower down?—A thing of that kind, of course, would be coveted by everybody; but I think that the Brentford people will find that when we get a lock at Isleworth the force of the water coming over the weir, or in high tides over the lock itself, will wash away much of the sediment which accumulates, provided that there is only a fair amount of dredging to set it afloat. The tide also comes up with great strength to Brentford, and as it will be a little checked by the lock I think that its ebb will help to carry the mud away. The state of the river at Brentford is now as bad as it can be, I admit; but my belief is that Brentford will be very much improved by a lock at Isleworth, and if after a few years they want a lock, you must let them have one at Putney or somewhere there.

The witness withdrew.

F. H. N. Glossop, Esq. (of Amyand House, Twickenham), examined.

F. H. N. Glossop, Esq.

(*Mr. Glossop.*) I take the liberty of introducing the deputation from Isleworth, and, as these gentlemen represent very different interests, possibly the Commissioners may think it convenient to examine them separately. I can say individually that I have known the state of the river between Isleworth and Teddington for the last 30 years, and have been in the constant habit of boating and fishing in the river and walking upon the side, and I can speak from positive knowledge that in 20 years the depth of the river at low water (and we have low water in this neighbourhood for 9 hours out of 12) has certainly very much diminished. I recollect it distinctly as a youth that we could always row up between Richmond and Twickenham on the Middlesex side of the river, and that was in the wherries of those days which drew more water than the wager boats of the present day, but I now find when I go out upon the river, whether I row myself or have a waterman to row me, that there is no possibility of coming up on the Middlesex side between Richmond and Twickenham. I have been living at Twickenham for the last few years, and certainly there is a most offensive smell from the drains. The cause seems to me to be that the drains having been constructed many years ago to deliver the sewage at the edge of the river, now no longer reach the water, from the water being lower than it used to be; they are uncovered for many hours; the drains, moreover, are at so high a level that even if they were lengthened, the inconvenience would not be remedied.

6602. (*Chairman.*) We have had it in evidence here that the river has been reduced in its low-water channel, that it has recently been very much fouled, that the companies are considered to abstract much more water than they did formerly, that the river is more impeded by weeds in the upper part than it was formerly, and that there is a general feeling in this district that some improvement should take place either by erecting a new weir and lock or by some other means. In which of these things do you agree?—All those things I perfectly agree in.

6603. (*Professor Way.*) In case of its being found necessary to levy an equitable rate on the inhabitants upon the immediate banks of the river, in order to meet the cost of river improvements, would any opposition be made?—There certainly would be very great opposition if the area of the rating was extended at all beyond the immediate banks of the river. For instance, the parish of Isleworth extends as far as Hounslow, but probably the inhabitants of Hounslow would very much object to being rated for the benefit of the residents on the banks of the river.

6604. That would not be equitable?—No.

6605. But would not Brentford be willing to contribute to such a tax?—I think so.

6606. (*Chairman.*) Hounslow cannot be sewered except into the Thames?—Not at present, but I believe a company is about to be started, with the object of draining Hounslow and part of Isleworth in another manner.

The witness withdrew.

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Mr. J. R. Berry.

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Mr. John R. Berry (of Isleworth) examined.

6607. (*Chairman.*) What are you?—A master lighterman.

6608. How long have you known the Thames?—All my life. I have been on the river from 35 to 40 years, and I have navigated between Old Windsor and Gravesend.

6609. Have you observed any alteration in the Thames since you have known it?—In depth, in the last 25 years, the water has quite gone away 2 feet.

6610. At what part of the river?—About Isleworth and Richmond.

6611. To what do you attribute that?—To the dredging of the conservators commencing at the wrong end.

6612. You mean the dredging down in the pool, and through the area of the metropolis?—Yes; they first commenced dredging at Woolwich, and then they came up to Bugsby's Hole, and from there to Limehouse Reach, and from there to the Tunnel Pier.

6613. And so they have lowered the bed of the river and drawn off the water from the upper part?—Yes.

6614. From below Teddington lock?—Yes, they have dredged every hill between Isleworth and Woolwich that I know of, so as to make a deep channel for the water to run away. Then we do not get sufficient water above; they allow the water works to pound the flood from us above, and take all the surplus water, so that when the tide turns out the basin is empty, and there being nothing to supply it, we must be without water.

6615. (*Mr. Harrison.*) Is the level of low water at London Bridge much lower now than it used to be?—Yes, considerably.

6616. (*Professor Way.*) The conservators are coming up the river?—Yes, they have a machine just below Isleworth which has reduced our water something like 4 inches from what it used to be, before we had these heavy rains.

6617. Will the embankment have any effect upon the water?—It will give us a little more water just at high water, but it will not keep up the water.

6618. Will not you have a longer flood?—Just for five or ten minutes.

6619. (*Chairman.*) And a little quicker velocity there?—Yes, there will be a better wash and more scour which will purify the water more.

6620. (*Professor Way.*) Would the proposed weir at Isleworth give you more water or less water below the weir?—It would not alter it at all.

6621. Would there not be less space for the tide to fill?—There would perhaps be a little more water on the flood tide; the lock would be a sort of tide lock. I do not think that it would impede navigation to the extent which is expected. I am a barge owner, and I should be very pleased to see it.

6622. (*Chairman.*) If the Thames should be put into a better state, would you, notwithstanding the railways, get a large barge trade back upon the Thames?—If you ask my opinion I say no.

6623. Would not coals and timber, and things of that description, be carried by river in preference to the rail?—No, not for a longer distance than Kingston.

6624. Do you know the upper part of the Thames navigation, above Kingston?—Yes, up to Old Windsor.

6625. You think that railways have it in their power to cut the navigation down in price?—Yes, in price and in time; it is time which does it; in fact, time is price.

6626. (*Professor Way.*) If the works had been kept up in the upper part of the Thames, the navigation would still have fallen off?—Yes, it must have done so, there is nothing to prevent it. For instance, if a man buys 100 sacks of flour in London to-day and lives in Reading, by rail he can have them up to-morrow.

6627. (*Chairman.*) Then if the upper Thames is to be put in repair, it must be from some other motive than that of competing with the railways?—I think so, so far as my judgment goes. I do not think that however much they put the navigation in repair they will ever get any substantial traffic upon it. Time is everything. You asked Mr. Bohn whether they would require a lock below the proposed pond. I should say no; they never would require a lock below; they may want one at Kew Bridge, at Strand-on-the-Green, but not one lower than that; there is always sufficient water below.

6628. Then by dredging they might deepen the water?—Yes.

6629. They might dredge to any extent they liked?—Yes, a lock at Strand-on-the-Green would be very awkward for the navigation at Kew Bridge, and it would be very awkward to put it between the islands at Brentford; a point but ¼ of a mile above the Grand Junction canal would be a very good place for it.

6630. Do you agree with the memorial presented by the Twickenham committee, petitioning the Thames Conservancy for the establishment of a new lock?—Yes.

The witness withdrew.

Mr. H. Day.

Mr. Horatio Day (of Isleworth) examined.

6631. (*Chairman.*) Where do you reside?—A Isleworth.

6632. What are you?—A medical man.

6633. In what sort of condition is Isleworth, in a sanitary point of view?—It is not so good as it used to be, which I attribute in a great measure to the state of the Thames. In the last two or three years we have had more epidemics than I have ever known before.

6634. What would you specify as the characteristic malady of the district?—Malaria arising from the exposed surface of mud.

6635. What would be your remedy?—The mud of course should be removed if possible; if not, the only thing would be to have the mud covered with water, so that the exhalations would not affect the neighbourhood.

6636. What class of disease prevails there now?—Low fever, smallpox, measles, and scarlatina in the last two or three years.

6637. In what kind of houses?—Principally poor houses.

6638. Do different families occupy separate rooms in the same house?—The houses are of a mixed class. The people are crowded together, but, generally speaking, not so crowded as in many villages.

6639. Have you noticed that where disease occurs there is crowding?—Yes, decidedly.

6640. Would you suppose that that crowding may have as much to do with the sickness as the Thames?—No, not so much. I have no doubt that the disease originates with the foul air from the Thames.

6641. Not the foul air in the houses?—No, I think that the disease is engendered by the foul state of the atmosphere outside. On hot evenings in the summer it is almost impossible to bear the smell of the Thames.

6642. In what condition on a hot evening are the people inside those houses?—They let in foul air by opening the door.

6643. (*Mr. Harrison.*) What is the state of the sewerage of Isleworth?—We have no proper system of drainage at Isleworth. The soil itself seems to act as a natural drainage; it is a gravelly soil, and the sewage filters through the gravel.

6644. Where do the inhabitants obtain their water from?—Principally from springs.

6645. How do you keep those springs separate

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from the sewage which percolates through the gravel?—That is very difficult.

6646. You think that the two get together?—Occasionally. The spring water at Isleworth is generally very good, except when it gets infiltrated.

6647. Are you aware that spring water apparently good is sometimes found to be the cause of very serious illnesses?— Yes.

6648. Is it not probable that it is the case at Isleworth?—I have frequently traced illness to proximity to a cesspool.

6649. And has that cesspool been removed?—Yes, and the water has afterwards become pure.

6650. Are there any cesspools still existing?—Yes.

6651. (*Chairman.*) Can you expect anything but illness in Isleworth if this condition of things continues, the houses being confined, with a close population, and cesspools existing in the town, and the water for the supply of the inhabitants being drawn from wells with which these cesspools can communicate?—Isleworth, generally speaking, up to the last two or three years has been an exceedingly healthy place; it is famous for the longevity of its inhabitants.

6652. What is the death rate?— (*Mr. Bohn.*) Nearly 16 in a thousand.

6653. (*Professor Way.*) How far are the cottages of which you speak elevated above the banks of the Thames?—Not many feet.

6654. Do you think it possible that when there was more water in the Thames these deleterious matters might have been diluted?—I think so.

6655. The cause of ill health then is the taking away of the water of the Thames?—That is what we complain of.

6656. Because of the smells?—Yes.

6657. (*Mr. Harrison.*) What manufactures are carried on at Isleworth?—There are a brewery, a cement manufactory, and timber yards.

6658. Are there any paper works there?—No. There used to be a calico manufactory there, but it has been done away with for many years.

6659. (*Chairman.*) Do you agree with the basis of the memorial which I hold in my hand?—Quite so. I attended with the deputation before the board of conservators.

6660. Is there anything further which you wish to state to the Commission?—No, except that I quite agree with the evidence of Mr. Glossop and Mr. Bohn, and I endorse it in every way.

The witness withdrew.

Mr. SAMUEL STYLES (of Isleworth) examined.

Mr. S. Styles.

6661. (*Chairman.*) Are you acquainted with the memorial which I hold in my hand?—Yes.

6662. Do you agree that the Thames should be improved by putting a new lock and weir as suggested here?—I do.

6663. For what special purpose?—For the benefit of the navigation and also of the banks of the Thames.

6664. Is the Thames lower in its water than it used to be formerly?—Much lower.

6665. To what cause do you attribute that?—To the dredging.

6666. Did you hear the evidence of Mr. Berry?—Yes, and I agree with it.

6667. If barges could go to and fro with more certainty, do you think that there would be more traffic? I think so because the barges now are for a long time detained between Teddington lock and Isleworth; and the same rule applies to barges coming from London.

6668. Is the water any fouler now than when you first knew it?—Much fouler.

6669. Is the foulness caused by what comes down the river or by what the tide brings up?—By what comes up the river.

6670. And the accumulation in the river below?—Yes.

6671. (*Mr. Harrison.*) How far down the river below Teddington do you find the obstructions to the navigation?—There is not so much interference lower down as there is about here, because lower down they get the turn of tide much quicker.

6672. At what point do you find the obstructions cease to the navigation?—At Barnes or anywhere down there you get water into London at any time of the tide, but between Twickenham and Isleworth you sometimes get a delay of an hour or two.

The witness withdrew.

ROBERT ALEXANDER SMITH, Esq., further examined.

R. A. Smith, Esq.

6673. (*Chairman.*) You produce a map of Richmond Bridge showing the low water-level at some given date, what date is it?—1774.

6674. On this day how much is the water below that water level?—Nearly 2 feet at this moment at a quarter-past three. It is now as nearly as possible low water, but there is a good deal of land water now in the river. It is usually upwards of 3 feet below the line on the map, and in summer the whole of the piers are quite clear of water.

The witness withdrew.

ROBERT MACANDREW, Esq., F.R.S. (of Isleworth House, Isleworth), examined.

R. Macandrew, Esq., F.R.S.

6675. (*Chairman.*) How long have you resided on the banks of the Thames?—About nine years.

6676. Have you observed any alteration in the Thames since you took your residence there?—I have observed considerable alteration in the level of the water at low water. I built a boathouse with the intention of having about 8 inches of water at low tide and at present it is quite empty during several hours each tide when the water is lowest during the dry season.

6677. (*Mr. Bohn, through the Chairman.*) Have you not paid the conservators for your boathouse?—Yes, I have paid a certain tax. There is another thing which I have observed of late years, the Thames has had so very small a quantity of water from above that an additional quantity of slimy mud is permanently deposited by the tide from below. Mr. Styles, I have no doubt, can confirm this.

(*Mr. Styles.*) Yes.

6678. (*Chairman, to Mr. Macandrew.*) Do you think that the pumping operations of the water companies have anything to do with the lowering of your water?—Yes.

6679. You are acquainted with this memorial?—Yes, and I quite concur in what is there stated.

6680. (*Mr. Bohn, through the Chairman.*) Would the site which is suggested for a lock and weir in the Duke of Northumberland's grounds be an eligible one?—I think so.

The witness withdrew.

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Rev. G. G. P. Glossop, M.A.

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The Reverend **George G. P. Glossop**, M.A., Vicar of Twickenham, examined.

6681. (*Chairman.*) I think that you signed this memorial, and presided at the meeting which was held a short time ago at Twickenham to consider the question?—Yes.

6682. And you can state what is the opinion of the influential gentlemen resident there?—Yes, certainly I can. They are in favor of a lock on the Thames, and consider that the Thames is now running dry.

6683. What is your own experience of the impurities of the Thames?—I was born at Isleworth, and have known the Thames ever since I could see anything. Last summer I lived at Twickenham in the Vicarage House, and on two occasions I was annoyed by the smell from the river. One occasion was after dry weather for several weeks, we had a violent thunderstorm in the middle of the night, it was at low water, and a drain which had been dry for some time, was, I suppose, washed out into the Thames, and the smell was frightful. I must say that I never smelt such a smell in my life before, it was awful.

6684. (*Mr. Harrison.*) Is not that an argument rather for removing that drain to another direction than for any alteration in the Thames itself. In that case the Thames does not seem to have been in fault?—I do not state it as an argument for a lock; the strong argument for a lock, in my opinion, is that the river is running dry, people can hardly get into the ferry. I have been quite puzzled to get a boat by the ferry at Twickenham. I have been hardly able to hit upon the channel so as to get by the hills in the middle of the river.

6685. (*Chairman.*) Is the river at that part losing its character?—Entirely as a beautiful piece of water for people to go about on in boats.

6686. For pleasure purposes?—Decidedly, you may say that it has lost its character.

6687. Both for beauty and for use?—Yes, it is no longer so beautiful, nor so useful, as formerly.

6688. There is exceedingly valuable property situate upon that portion of the Thames?—Yes, the land there is worth a great deal per acre.

6689. (*Mr. Bohn, through the Chairman.*) I think that you had a communication with the Duchess of Northumberland upon the subject?—Yes, she lives near the ferry at Twickenham. She wrote me a note saying that she was very glad that we were going to have a meeting, and saying that the smell of the Thames was sometimes so offensive that she kept her windows shut. That is the Duchess Dowager of Northumberland.

6690. (*Mr. Harrison.*) It is necessary to consider the question of the diminution of the volume of the stream with that of its increasing pollution?—We cannot help it. If it had been high water I should not have been sensible of the drain being washed out into the Thames, but because it happened to be low water, therefore, I smelt a tremendous putrid smell.

6690*a*. (*Chairman.*) Was that the drain which drained your house?—No, I think not, there are several drains which run in about there, and I have no doubt that the foul water washed into the river came from several people's drains. We are down upon the water's edge, and therefore it is very hard for us to drain any where else than into the river, we should not object to drain anywhere else if we could.

6691. (*Mr. Bohn, through the Chairman.*) Are there not a good many mounds in that part of the river-bed made of sewage?—No, I think that they are gravel, with a little coating of sewage.

6692. Is there anything which you wish to add?—No, the greatest grievance to my mind is that we have no water in the river—the river is running dry. The question of drains I quite feel to be another affair.

The witness withdrew.

Mr. R. Burrows.

Mr. **Richard Burrows** (of Twickenham) examined.

6693. (*Chairman.*) What do you wish to state?—I can only add to what Mr. Glossop has said, that we find smallpox and fever at Twickenham just now very severe, on the banks of the river.

6694. Is that from the river?—It must have something to do with the river, for the houses affected are all on the banks.

6695. What are you?—I am a brewer.

6696. Do you, as a brewer, turn any refuse into the river?—Yes, there is a very old drain through the town which runs into the river.

6697. Is it a very little one?—It is about 2 feet 6 in diameter.

6698. At all events you have no other place, I suppose, at present, into which to turn your refuse?—No.

6699. It goes the way that it has always gone?—We used to turn it into the Colne, and lately we have made a drain and turned it into the Thames.

6700. You have not considered whether you could utilize your refuse the same as Mr. Bohn says that he utilizes his, upon land?—No, I have not.

6701. (*Professor Way.*) What does the refuse consist of?—The washing of casks, utensils, and so forth.

6702. (*Chairman.*) Is there anything which you wish to add?—No, except that barges are a very long time coming up from London in consequence of shortness of water; we are obliged to go quite into the mid-stream to get to the barges.

6703. (*Professor Way.*) Do they bring you malt?—Yes, malt and barley principally.

The witness withdrew.

Mr. J. T. Platt.

Mr. **J. T. Platt** (of Twickenham), ferryman, examined.

6704. (*Chairman.*) What is your experience with regard to the river; have you more difficulty, or not, at low water than you used to have?—The hills are all filling up. I know where there used to be 2 feet of water along inside Eel Pie Island, at Twickenham; now there are not two inches in the summer. There used to be plenty of weeds in the Thames, and they used to keep the water up; they used almost to form a lock of themselves, and now the dredging makes a very deep hole in one place, and passes over another.

6705. They do not dredge equally?—No; when the city boats used to clear out a channel, if there was a hill, they made it level, and they went down about 6 feet; but now these steam dredges go 20 feet deep in one place and leave 2 feet in another. That is no use. A barge which passes the 20 feet will stick on a place where there are only 2 feet of water; you will never keep a channel like that.

6707. And all those cuttings away draw your water off and leave you dry?—Yes, there is scarcely any weed now, and the weed used to keep up the water.

6708. (*Mr. Harrison.*) How do you account for there being no weeds now, as there were before?—Because the river has been cut about in one way and the other, so that the weeds are all destroyed. You cannot get an empty boat ashore. I have known thousands of tons of ballast taken out at the ferry.

6709. (*Professor Way.*) If they made it all an equal depth, would you not have still less water?—No, I think not. What is to become of the material which is dredged out? There is no force of water to carry it away at all, and it all subsides again in the channel. I can hardly get across the ferry with eight people in the boat, in the summer.

6710. (*Chairman.*) I suppose that if you put down

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a few stones, persons might cross without a boat ?—Yes, to the island, not the channel.

6711. (*Mr. Harrison.*) Do you observe much difference in the velocity of the stream at low water, where you ferry across the river ?—No, the stream is of about the same velocity as it was years ago. I do not think that the channel has altered much. It is only where these holes are made, and what comes away settles on these shallows. There are one or two places very bad ; between Twickenham and Richmond it is very bad, just this side of Petersham Lane.

The witness withdrew.

Edwin Chadwick, Esq., C.B., further examined.

E. Chadwick, Esq., C.B.

6712. (*Chairman.*) Do you wish to state anything further ?—Dr. Hassell, a physician and friend of my own, and the owner of the house where I reside, was very desirous of being here, and he requested me to state on his authority, that, whereas the condition of Richmond was very extensively bad, fever being constantly prevalent in certain spots, fever is very infrequent, and he attributes the improvement partly to better house drainage, but especially to a purer water supply. He therefore corroborates what I have stated that a great deal of the impurity which is manifest at times of heavy rainfall is largely due to the quantity of surface washing from the land in the vicinity. I may add that efforts have been made by Dr. Hassell and others to introduce extensive sanitary improvements in Richmond, but they have hitherto failed. For the want of some responsible competent person officially to investigate and report upon the evils of the town, the people of Richmond have not bestired themselves.

(*Mr. Chapman.*) It is almost impossible to remedy the evils that the relieving officer has described of houses ill constructed, ill supplied with water, and overcrowded. Richmond lies beyond the operation of the Metropolitan Building Act or the Metropolitan Government Act. Here small speculators are allowed to do as they please. They build just the sort of tenements for the poor which bring them the greatest amount of rent with the least amount of expenditure, and there are no means either public or private of preventing them.

6713. Then the parish has nothing to do but to meet in vestry and by resolution adopt the Local Government Act and so immediately get machinery which is not centralization and which yet will give power to regulate all that class of building ?—Persons did try to get that act adopted here, but unsuccessfully. It was almost unanimously rejected.

(*Mr. Bohn.*) The vestry is made up of the very people who are doing the mischief.

(*Mr. Chapman.*) I think not ; not one-thirtieth part I may say.

Adjourned till Wednesday, January 23, 1866.

Lechlade, Wednesday, 3rd January 1866.

Present :

ROBERT RAWLINSON, Esq., C.B., in the Chair.

John Thornhill Harrison, Esq. | Professor John Thomas Way.

Mr. Henry Parker (of Lechlade) examined.

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6714. (*Chairman.*) What are you ?—A farmer.

6715. How long have you known the Thames in this district ?—Nine years.

6716. Is the river frequently flooded ?—Yes.

6717. Do you consider the floods injurious to the adjoining lands or otherwise ?—Injurious.

6718. Is there any part of the river where the floods are by embankments effectually kept out ?—Part of my land is embanked.

6719. Have you shut out the floods successfully ?—Yes. Except from insufficient outfall.

6720. I have observed that certain banks have been formed in the district bordering upon the river, were they constructed with the view of keeping out floods ?—Yes; they have failed through inattention after they were made.

6721. Have they been trodden down by cattle ?—Yes, they were not fenced off. There is just enough of the embankment now to allow the water to get in, but too much of it to let it get out, consequently the water is injurious.

6722. What area of land do you think is under water to-day taking a mile either way up and down the river ?—Several hundred acres.

6723. Taking a length of three miles, are there 500 acres under water now ?—Certainly.

6724. Would it be expensive to keep the water off the land, if proper banks were formed ?—No, not if they were maintained.

6725. Do you know what the condition of the river is now as compared with what it was formerly ?—No, but I know that it is now in a very bad state.

6726. Is it gradually silting up ?—Yes, so that frequently boats cannot get on at all.

6727. Is the tendency of that filling up to throw the water over all the upper land on both sides ?—Decidedly so.

6728. If that is allowed to go on you would expect the inundations to extend more widely upon the land within reach on either side ?—Certainly.

6729. Taking into account the cost of embanking, and the benefit done to the land by preventing flooding, do you consider that it is a paying transaction to embank ?—It would require some consideration to answer that question. Some meadows are benefited by this sort of flood, but a flood which comes earlier in the season might destroy much food ; it might, for example, come in the summer and take away our hay. I have known it to come at a time just before the mowing took place, and the whole of the grass was under water; but this present flood I should say would do good to the land generally on which it runs.

6730. Would it not be possible so to embank the land so as to keep the water off at your will and let it on at your will ?—Certainly, and if that was done it would be a great improvement to the land near the Thames. The floods rise more quickly than they used to do, in consequence of the worse state of the river below Lechlade.

6731. To what do you attribute that more sudden rising of the floods ?—To the unequal bottom of the river. The river has been very ill attended to, and is in a most disgraceful state in many places.

6732. In what condition are the locks and weirs ?—Very bad indeed, so far as I know. I should like to see all the locks done away with, and let the Thames have its natural course.

6733. For what reason ?—We should not then have the floods that we have now ; I mean the small floods

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from any slight quantity of rain. We should still have the great floods after a great quantity of rain. But the Thames would take the small floods away, whereas now the water is penned up for fishing or other purposes.

6734. Supposing there were neither locks nor weirs, have you any idea in what condition the bed of the river would be in summer?—At certain places it might be almost dry I think, but not quite; it never is quite dry now.

6735. You do not think that the removal of the locks and weirs would be attended with any disadvantage?—No, I should rather prefer to see it so.

6736. What is the ordinary value per acre of grass land in this neighbourhood?—From 30*s.* to 2*l.* an acre.

6737. Would the whole of a farm let for that?—Perhaps so, taking grass and corn land together; it would be high for corn land.

6738. What would the best meadow land in the neighbourhood of the river let for?—From 40*s.* to 50*s.*

6739. Is there much fishing carried on in the river?—There is, but it is not very valuable. I should think the profit was very little.

6740. Is there much pleasure boating on the river?—Very little. We now and then have some Oxford gentlemen pass through, but very seldom.

6741. Are there any pleasure boats kept on the river here?—No.

6742. (*Mr. Harrison.*) Has there been much land drainage carried out in this neighbourhood?—Yes, considerable, but not so much as in many other places. So far as quantity of drainage goes, I suppose Mr. Campbell has done perhaps more than any other man in the neighbourhood.

6743. Has there been much drainage carried out in the upper reaches of the Thames above Lechlade?—No; at least I am not aware of it.

6744. Whereabout do your meadows in the Thames lie?—Opposite to Buscot.

6745. Have any complaints been made by your neighbours in consequence of your having embanked the Thames?—Yes, there was great complaint made of the Inclosure Commissioners coming down here, and I met with considerable opposition, but a decision was given in my favor, and I threw the embankment up.

6746. What is the effect now of those embankments?—That a quantity of very poor grass land indeed has been converted into useful arable land, and is now never flooded.

6747. Does your embanking affect your neighbours on the opposite side of the river?—They have never found fault; they have not higher water than before the embankment was thrown up. I have only thrown up an embankment for a mile, but it is a very difficult place, as you may have noticed—where the Thames is very crooked, just below Lechlade.

6748. (*Chairman.*) What did the bank you threw up cost per yard or rod?—The mile cost 200*l.*

6749. What is the height of it above the surface?—On an average 4 feet.

6750. What is the top width?—1 foot.

6751. What are the two slopes?—It is 9 feet at the bottom; it is a foot in a foot slope.

6752. That is, one to one?—Yes.

6752*a*. Is there a ditch parallel with the embankment?—Yes, on the inside, of the same size as the embankment.

6753. So constructed a mile costs about 200*l.*?—Yes.

6754. (*Mr. Harrison.*) How much do you consider you have improved the value of that land?—Double I think.

6755. What did you reckon it to be worth before?—15*s.*, it is now worth 30*s.* an acre, and perhaps a little more.

6756. Was there any peculiarity in your land that made it of so much less value than the best meadow land which you say lets for from 40*s.* to 50*s.*?—My land was not affected by running floods, but by the stagnant floods.

6757. Is Mr. Campbell's land seriously depreciated in value in consequence of the embankments he has thrown up not fulfilling their object?—Yes. I threw up my embankments not to keep the water off grass land, but to keep it off ploughed land, Mr. Campbell has thrown up his embankments to keep the water off grass land, and there is no exit for the water after the flood has gone down.

6758. Was your land arable before you embanked?—No, pasture.

6759. How close to the surface of the meadow is high water mark?—In many places up to the surface, which I consider is very injurious to a great number of acres. Every time a boat goes down, the locks are shut to raise the water up to a certain mark, and when that is done, all the ditches adjoining the Thames are filled. Sometimes that has occurred several times in a week in summer; the more traffic there is the more injury is done to the land—by this means the land is chilled; there is much land adjoining the Thames that, instead of being dry, is quite wet.

6760. Independently of actual flooding, the land is injured by the water being kept too high?—Yes.

6761. At what height do you think it would be desirable to keep the water in the river so as to give the greatest amount of benefit to the adjoining meadows, independently of floods?—I cannot say, certainly as low as possible, so that a boat could go down.

6762. In consequence of the embankment which has been carried out in your neighbourhood, has the river encroached upon the banks in any way?—No, I do not see that it has.

6763. (*Chairman.*) What width is there on the inside between the ditch and the foot of the bank?—18 inches.

6764. And at the top the bank is one foot wide?—Yes, and 9 feet wide at the bottom. The subsoil is gravelly and of course the ditch does a great deal of good to the arable land, here and there there is a vein of clay.

6766. (*Professor Way.*) You do not think that it would be worth while to attempt to restore the navigation?—I should think not.

6767. (*Mr. Harrison.*) Have you ever experienced any ill effects from the system of flashes?—Yes, that is what I was speaking of just now; every time that a boat goes down now I suffer from it.

6768. Have you known flashes to cause an artificial flood upon adjoining land?—No, but almost as bad, by filling ditches, and there remaining for sometime to chill the land.

6769. (*Chairman.*) How long is it since you made your embankment?—About five years from this time. Mr. Josiah Parkes did it.

6770. Did you get the money from the Government to do that work?—No, but I should have no objection to do so.

6771. If you could have borrowed the money from the Government at a low rate of interest, you would have been glad to have done the work under their superintendence, and to have repaid the money by gradual instalments?—Certainly.

6772. Do you think that that feeling is pretty general in this neighbourhood?—I think it is more so than it was formerly. We have had work of the sort began in this neighbourhood without the assistance of Government, but it has fallen to the ground, and I think that if the work had been done under their superintendence it might not have done so.

6773. Which should you prefer if you had a choice—to have the money lent you and do the work yourself under superintendence, or that an estimate should be made, and that Government should do the work for you?—I should rather have their help.

6774. Do you mean in superintendence or in executing the works?—I mean in the construction of the

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works; an example has been set by works already executed. I think that these works are never done so well as when they are done by people who really understand them.

6775. If the whole of the Thames had to be embanked from top to bottom, the work, if it did not cost more than has been mentioned, would not require so very large a sum?—It would hardly cost so much as has been said. Mr. Campbell did his works, I believe, for 8*s.* a chain, or less than that.

The witness withdrew.

Mr. RICHARD ALBERT ILES (of Kempsford) examined.

Mr. R. A. Iles.

6776. (*Chairman.*) What are you?—Agent to Sir Gilbert East, Bart.

6777. Are you a farmer as well as agent?—Yes, in the neighbourhood of the Thames.

6778. Where are the estates of Sir Gilbert East principally situated?—Just above Lechdale—the Thames bounds the estate for two or three miles.

6779. What acreage does Sir Gilbert East hold bordering the Thames?—From 250 to 300 acres affected by the river.

6780. Is it all grass land?—Yes.

6781. You could not cultivate it in any way if it were flooded?—No, it is just possible that some few fields, by embanking and dredging and making drains, might be broken up, but scarcely any.

6782. How long have you known the Thames?—All my life.

6783. Is the bed of the Thames silting up now worse than it used to be?—I think it is.

6784. Is any part of the land of which you speak embanked?—Yes, a good part of it was years ago, but those banks have not been attended to for a number of years now, and I should say they are useless. There is a large portion of arable land secured from flood by embanked drains which still act very well.

6785. Did you hear the evidence given by Mr. Parker?—Yes, but the embankment I spoke of is a different embankment to Mr. Parker's; Mr. Parker's is an embankment to keep the water entirely from the land, having an inside drain, which empties itself at a lower level. The embankment that I spoke of was simply running down the meadows, with an opening at the top; in fact I may say many openings to it, whereby the water is let off the meadows in summer time, and turned on in winter; for meadows will benefit by the winter flood.

6786. What is the value per acre of the land influenced by the river?—Much meadow land by the side of the Thames is worth as much as Mr. Parker said; there is a great deal that is not worth that.

6787. If this land could be embanked and treated as Mr. Parker described, so as to let the water on at will and keep it off at will, do you, as an agent, think it would acquire additional value?—Yes; but that was not Mr. Parker's description. His description was this, to keep the water off altogether.

6788. The cost would be very slightly increased by having flood gates to let in the water, and sluices to let it out, do you think that the land might be benefited by having embankments with such an arrangement?—There cannot be a doubt about it.

6789. In all cases the owner or farmer should be master of the water, and do with it what he thinks proper?—Of course. The Thames above Lechlade is perhaps a little different to what it is below. Below Lechlade it is used as a navigable river now, and consequently, in order to let boats pass down, you must keep the weeds and so forth, to a certain extent, clear, and by this a freer passage is given to the water. But above Lechlade that is not so. The weeds are allowed to grow, and in some parts the river is kept as a fishery. I have a strong impression that, if the stream were thoroughly cleansed above Lechlade, without any embankments at all, a moderate flood would pass down.

6790. Without any embankment?—Yes; but then if that were to be done alone, the meadows would be injured. You should at the same time put in some locks at proper places and then you might, under certain regulations, turn a good flood over the meadows, and benefit them, even to a greater extent than they receive at present, and you will also keep the land dry, and improve the drainage.

6791. Is the water that is now coming down considerably discolored?—Yes.

6792. That discoloration is due to the soil is it not?—Yes.

6793. And if you had the power of letting that at this time of the year upon certain kinds of land, until that fine material was deposited, you would have a rich manure upon the land?—Yes, I think so.

6794. You would consider any arrangement enabling you to do that as beneficial?—Yes.

6795. (*Professor Way.*) If the water was clear, you would still consider it was doing good?—Yes.

6796. (*Mr. Harrison.*) For how many days do you think it would be beneficial to keep the water on the land?—For two or three days at a time. Much would depend upon the rain. If a very heavy rain comes on, the water becomes very thick, and it should be turned out directly. I would let it remain for 24 or 48 hours.

6797. Does it not sometimes happen that the meadows are flooded for weeks, and even for months together?—In the year 1860 the meadows were under water for 29 days in succession.

6798. What effect had that?—A very bad effect upon that crop, because it was in the month of June. The flood came out on the 2nd of June and it was not off till the night of the 30th.

6799. Did that flood destroy the roots of the grasses?—The meadows were benefited for subsequent use, but that crop of hay was entirely destroyed and left to rot.

6800. Are you aware whether any persons ballast the Thames above Lechlade?—Not that I am aware of.

6801. Do the commissioners do anything to the river?—No.

6802. It just takes it own course?—Yes.

6803. On the property of which you are the agent is there much wasting away of the land at any particular points by the banks being washed down?—The stream is not sharp enough for that. There may be a little in some places.

6804. Have you any rights of fishing connected with the land?—Yes. There was formerly a right of netting on the Kempsford side, and that was sold some years ago. I believe there is only the right of angling on our side.

6805. What is the money value of that right per annum?—I cannot say.

6806. You do not receive any pecuniary benefit from it?—No.

6807. But I suppose it is a consideration in the letting of the land?—Yes, where you have a right of netting. But merely angling is hardly worth consideration.

6808. Are there any weirs maintained for fishing purposes above Lechlade?—Yes; there is one just at the bottom of Kempsford parish, at the top of Lechlade parish, and one further up.

6809. Are you aware of the extent to which land drainage has been carried out in the upper reaches of the Thames?—It was carried out to a large extent many years ago, and there is a great deal of arable land in Kempsford parish protected by embanked drains in much the same way that Mr. Parker has described his to be, and one bank, I think, is as long as Mr. Parker's.

6810. Do you agree with him that the floods come down more rapidly than they used to do?—Yes; not to any great extent. They have come down a little quicker upon us these few years past at the top of the

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parish, and for this reason, a great deal of drainage has been done in a parish above us—Down-Ampney parish—the tributaries have been cleansed, and the Thames also by Lord St. German's agent, and that has let the floods down rather quicker.

(*Mr. Parker.*) What I meant to say was that the flood cannot get away so quickly, and therefore that the water comes down more quickly.

6811. Is there anything further that you wish to state?—It strikes me that by not doing away with floods, and by having proper locks and weirs put in so that meadows can be flooded at will, you will ensure the water being sent on to the towns below pure, because water which flows over meadows leaves its settling behind and flows off purer.

6812. If the drainage of villages is emptied into ditches and passes from one ditch to another into a stream or brook, the water must flow down muddy, and if you could pass that water over the meadows in a thin body, and let it settle, the sediment that it would leave upon the meadows would not go into the stream?—No.

6813. What is the character of the Coln?—The character of the chief river, the Coln, is very pure. It is a brook with a rapid fall, and does not receive much drainage. On the other hand, the Churn comes down from Cirencester, receives the drainage from Cirencester and all the villages, and ultimately comes into the Thames at Cricklade. I cannot say that it comes down very muddy, because the principal drainage from Cirencester is turned over the meadows before it comes to Cricklade, still it does come down thick.

6814. (*Professor Way.*) If you had the control of water on grass land, at what level below the surface would you prefer to keep it in ordinary times?—2 feet or more.

6815. In your case is the water within 1 foot of the surface for any considerable portion of the year?—In winter it is, but not in summer; we are differently situated now, because we have no navigation. It is an old navigable river, but has not been used for navigation above Lechlade since the canal has been opened.

The witness withdrew.

Mr. W. Arkell.

Mr. WILLIAM ARKELL (of Lechlade) examined.

6816. (*Chairman.*) What are you?—A farmer. I occupy 700 acres under Sir Gilbert East. 80 of these acres are what we call "Thames Meadow," and are subject to flood.

6817. (*Mr. Harrison.*) How many days may a flood lie upon the meadows and be beneficial?—We consider it beneficial through the winter months, provided it runs off soon, but injurious when it backs up, and cannot pass off.

6818. (*Chairman.*) Is the river in a better or worse state now than when you first knew it, as to the passing off of the water?—In some places it is very much worse.

6819. Would any of your land bordering the Thames be benefited by additional embankment?—I have embanked my meadow land, and there is an embanked drain made at the enclosure between the arable land and the meadow land, which keeps the flood off the arable land except at very high water when the banks are overflowed. That was done some years ago at the time of the enclosure.

6820. Do the Thames Commissioners interfere with your land, or do anything for or against you?—Not that I am aware of. Inglesham weir below affects my land very much, they pen up the water there for fishing purposes.

6821. Is there a footpath or road parallel with the river through your land?—No, there is a towing path, and Brooks' Swath.

6822. Is it open to the public?—The public walk up it for fishing purposes, but I rent the swath from Mr. Campbell.

6823. Is it considered that there is a right of footway along the margin of the river?—No, I should say not. There are several watercourses that empty into the river, and there are no bridges over them. There is no navigation. I should add that we are also affected by the lower weir at St. John's Bridge; when they pen up the water it backs up upon us and injures us.

6824. (*Mr. Harrison.*) You mean independently of flooding?—Yes. Yesterday there was nearly a fall of 2 feet from my lower meadow to the weir at Inglesham, which ought not to be.

6825. The obstruction should be removed in order to give you the full benefit of the riverfall?—Yes. As to the embankments I open places to let the water in, for I consider that we receive a benefit from the flood in winter time, although it is very desirable to keep it out in summer.

6826. (*Chairman.*) What is the nature of the subsoil?—In some parts there is a spot of gravel, but it is clay principally.

6827. Is there any lime in it?—Very little lime I should think in the meadow land.

6828. What manure do you use?—We seldom manure the meadow land near the Thames.

6829. Perhaps it is sufficiently manured by the flooding?—Yes.

The witness withdrew.

Mr. T. Arkell.

Mr. THOMAS ARKELL (of Pew Hill) examined.

6830. (*Chairman.*) Are you a farmer?—Yes.

6831. Have you heard your brother's evidence?—Yes.

6832. Do you agree with the principal facts which he has stated?—Yes, some few years back I wished to draw attention to the successful drainage of land in Kempsford, of which I am a native. For nearly four or five miles in Kempsford parish there is inside drainage as well as arterial, or Thames drainage for the country. In 1856 I took the trouble to write a paper on the matter, which appeared in the Gardener's Chronicle and Agricultural Gazette. I contend that floods are beneficial; that inside drainage may be carried out without doing away with floods on the grass land, if only you have a command of a great distance, so as to conduct your drains through one parish after another to the river at a lower level. Kempsford drainage is not quiteperfect now. There is a portion of land in Kempsford parish called Bomoor that would be greatly benefited if their principal drain was carried down, probably half a mile or further, to the lower level of the Thames. It is a poor peaty and moory soil, a gravelly subsoil.

6833. (*Professor Way.*) You were, I believe, formerly professor of agriculture at Cirencester College?—Yes.

6834. You wish to show that if there was a better outfall the land would be better drained in the neighbourhood of the Thames?—Yes, by inside drainage, instead of draining straight out to the river as the brooks used to run. I consider it perfectly clear that the river Thames ought to be cleaned out, and that there should be authorities to decide where there should be weirs erected, so that in winter, water might be turned on to benefit the meadows and in summer the meadows kept clear, summer floods being carried down without injuring the land. If that could be done the expense of flooding and of the weirs, I should say, ought to fall on the owners of the grass land that is benefited with it. The inside drainage and the embankments, I mean the embankments between the flooded land and the high land should be paid for by the owners of the high ploughed lands. With regard to Kempsford parish, my father, though a tenant, at his own expense embanked those meadows for a mile, and to shew what feeling there was in a wet summer when his land was dry, and the opposite parishes were flooded, men came and pulled up some plants he had in, and let the water run over his land. I may say, in this river the water is not thick enough to be beneficial for warping, any one looking at the flood to-day would think that all the land was being benefited. I say that only half of it is; which is and which is not you cannot see without getting into a boat and ascertaining whether there is a current, or whether the water is stagnant; Mr. Campbell has injured his own land and his neighbours' land for want of knowing, that water moving is a benefit, but as soon as it becomes stagnant it is injurious.

6835. A great part of the value of irrigation by flooding is due to the subsidence of the fine soil ?—It is.

6836. Is it not also the fact, shown by the effect of running water, that there is a chemical influence exerted by the gases and the salts, beneficial to vegetation ?—Yes.

6837. Therefore, if the water was absolutely clear and running, it would still be beneficial ?—Yes.

6838. (*Chairman.*) If the water is running, it retains a certain temperature on the surface, and is therefore beneficial ; but if it becomes stagnant it falls in temperature, and starves the land ?—Yes.

6839. (*Mr. Harrison.*) I understood you to say that the land your father had embanked was more or less of a clayey character ?—Yes.

6840. Are there not some meadows in the valley that have a gravelly subsoil ?—Yes, in places.

6841. Do you know any cases in which the land is embanked and water escapes from the river through the subsoil and rises up through the gravel on to the surface ?—Yes, the bulk of Kempsford parish will do that. The water runs under the embankments and stands up, but that is counteracted by the inside drain which cuts off all such water, if only there is provided a vent for it into the river further on at a lower level.

6842. So that in embanking land caution is required ; you must see what the subsoil is ?—Yes, that is the case ; in time, however, I think the water will petrify the soil of the embankment. The bed of the river is watertight. In any arrangement respecting the bed of the river here I think that the management ought to be in the hands of a respectable body elected by the land owners, each having a number of votes in proportion to the extent of the land owned by him adjoining the river. They might then agree to fix upon certain times for flooding and certain times for keeping out the floods.

6843. Could that be carried on with the present system of navigation ?—Yes, provided that there was inside drainage draining down below the next weir or mill.

6844. (*Chairman.*) I dare say you know districts where there is a want of power to make great arterial drains ?—Yes ; I can see on the opposite side of the river to Kempsford they have not a command over the river there. There are no less than three or four parishes that successively border on the river, and of course none has jurisdiction below its own proper limits at present. Before creating any arterial drainage they must get the adjoining proprietors or parishes to give leave.

6845. Do you know anything of the present commissioners for the management of the Thames ?—No, I have never seen one of them.

6846. Have you formed any idea as to the kind of government under which you would place the work of arterial drainage ?—I think it should be something tantamount to a board of commissioners or guardians of the river, but I should like to have persons to represent the different interests and the different varieties of land, according to the proportion to be benefited or injured. They might meet as a board of guardians do in a district.

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6847. And a majority should have power to initiate and carry out works required to be done ?—Yes, so that one obstinate man should not upset the benefit of a whole neighbourhood.

6848. (*Mr. Harrison.*) Have you observed whether floods come down more rapidly now than they used to do ?—Yes, they do in our parish, from the fact of Down-Ampney drainage.

6849. On the tributaries that fall into the Thames above Lechlade has there been very much drainage carried out ?—Yes, on arable land. The greatest work has been in Down-Ampney parish.

6850. Has it had any effect in diminishing the quantity of water flowing into the Thames in times of drought ?—No, I cannot see that. A regular system of drainage would lessen the floods. I know the two rivers here that have been mentioned—the Colne and the Thames. Into the Thames comes a great bulk of water from the Oxford clay. Hardly any surface water passes into the soil when the soil is once saturated ; as fast as the water falls it comes off the surface as from a glass roof, while, on the contrary, in the river Colne hardly any water runs into the river, it all runs through into the soil, and that river scarcely ever floods. If the land was drained the water ought to come down more steadily.

6851. (*Chairman.*) Do you think the tendency of deep draining large areas of clay land would be to send the water down in a larger volume from the land or in a smaller volume ?—In a smaller volume.

6852. But extending over a longer time ?—Yes, provided the draining is deep and efficient. Water after rainfall which has to pass through the soil into a deep drain must naturally take longer to come to the river than if it flowed over the surface of the land.

6853. Then you do not think that excessive flooding in the river is the necessary consequence of deep draining ?—Not at all.

6854. If land being naturally an absorbent swamp, something like moss, and retaining a large quantity of water which it lets off gradually, is drained so as to draw off the water at a quicker rate, then I suppose you must have some of this flooding ?—Yes, of course, you would lose that reservoir of water from the surface to the depth that you drained, and at the spot where the water used to ooze out there would not be the same supply of water through the summer after it was drained as there was before.

6855. The operation that you perform is upon an infinitesimal portion, a mere thin crust covering the true stratification ?—Yes, and I do not think it would affect the supply of water for the country or in the springs. After a dry summer the land must get full up to the drains before the water can begin to run off.

6856. Is there anything further that you wish to add ?—An allusion has been made in the evidence to a right of road on the river side. Before the canal navigation was made the river Thames was navigable up as high as Cricklade, and that accounts for the towing-path of nine feet, which is called now Brooks' Swath. There are no bridges and roads over it, but there were when the river was navigated, just as there were many weirs that have fallen down, and which no doubt might be beneficial for flooding purposes if they were under control.

6857. Are they absolutely in ruins ?—Two of them are. I believe one has been taken up, that is Kempsford weir.

6858. Who took that up ?—Mr. Archer.

6859. Did he take it up of his own free will, irrespective of any consequences that might follow to proprietors above or below ?—Yes ; it was sold in consequence of quarrels respecting it between him and the tenant of it.

6860. (*Professor Way.*) Did the Thames Commissioners take no notice ?—No.

The witness withdrew.

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Mr. CHARLES TURNER (of Kelmscotte) examined.

6861. (*Chairman.*) What are you?—A farmer, with my brother, at Kelmscotte, in Oxfordshire.

6862. How many acres do you farm?—Between 600 and 700 acres.

6863. What proportion of your farm has a Thames frontage?—90 acres.

6864. Do you think some authority should be constituted to have a control over the whole of the drainage area and power to execute the works necessary for the benefit of all?—That is my opinion

6865. Do you suffer in your farming operations by flooding at any time?—Yes. The flood is beneficial to meadow land, but injurious to arable land.

6866. Is the river in a worse or better state now than when you first knew it?—Decidedly worse.

6867. Is there more sediment in it?—Yes.

6868. Is there a larger growth of weeds?—Decidedly so.

6869. In fact the river is more neglected than it was?—Decidedly.

6870. Do you know anything of the commissioners who constitute the governing body of the Thames?—I do not.

6871. Do they never come near you?—No; they may occasionally have come up in their pleasure boat, but we see very little of them.

6872. They do not come to consult you?—Never.

6873. Supposing a new commissioner was about to be elected, should you have a vote for him?—I think my brother would, whom I represent.

6874. (*Mr. Harrison.*) Are not the weirs an obstruction to the course of the water now?—I think they are.

6875. Would not the erection of a greater number of them cause more obstruction?—If they were constructed on a better principle I think they would not.

6876. You would have a greater number constructed on a better principle?—Yes.

6877. As the river has silted up you would have it properly scoured out and put under control?—Decidedly.

6878. (*Chairman.*) What is the value of land per acre affected by floods?—It is grass land, and is always let with arable land; the two are let together at about 30*s.* per acre, or perhaps a little over.

6879. (*Mr. Harrison.*) Is any of your land embanked?—Not any. Our land adjoins Mr. Parker's, which is embanked.

6880. (*Chairman.*) Does the river passing through your land wash any of the banks away?—Not to much extent, but it does occasionally, and it gains on the other side.

6881. Does any person attempt to regulate the river in that respect?—It is left to take its own course.

6882. When the river forms a boundary, is any attempt made to rectify that boundary from time to time?—No.

The witness withdrew.

R. Campbell, Esq.

ROBERT CAMPBELL, Esq. (of Buscot Park), examined.

6883. (*Chairman.*) How many acres of land do you own in Buscot?—4,600.

6884. What length of Thames frontage have you?—About three miles.

6885. Is any part of that liable to be flooded?—Yes; perhaps 100 acres.

6886. The subsoil of the greater portion is clay?—Yes, back from the river.

6887. You have, I believe, executed very extensive drainage works?—I have drained 3,700 acres.

6888. To what depth?—Speaking of the main drainage, sometimes five feet, but nothing less than four feet.

6889. What distance are the drains apart?—About 18 feet.

6890. Had you any experience of the action of water upon the surface before you commenced draining?—No.

6891. I believe you began to drain immediately?—Yes, the moment I purchased the estate.

6892. In what time does the water get down to your drains?—Twenty minutes after rain has fallen the pipes begin to run, and if it is raining hard they run hard.

6893. That will depend upon the condition in which the land is. During the last summer, for example, we had two or three months of very dry weather?—In such a case as that it would take a longer time.

6894. Do you think you have overdrained or underdrained?—Part of my estate I wish I could drain at intervals of nine feet instead of eighteen feet.

6895. And to what depth?—I wish I had gone six feet down instead of four feet.

6896. Do you think that the water used to pass more quickly over the surface into the river than it does now through the drains?—That is a very difficult question to answer. There is no doubt that the water goes through the soil, and being carried off by main arteries, it ought to be more quickly conveyed into the Thames.

6897. What extent of embankment have you made?—My embankment is not of much use. I have not paid much attention to it. Virtually, my river frontage is not embanked.

6898. Could you easily put the banks into such order as to have the water under your command?—I do not know whether I should care much about it. I have not embanked more than half a mile.

6899. What did it cost you to do that?—Perhaps about 100*l.*

6900. Is it fair to ask you what the land drainage cost you?—Nearer 7*l.* an acre than 6*l.*

6901. Including the outlets and everything?—Yes.

6902. And surface improvements, fence grubbing, and so on?—No.

6903. You carried out a great improvement in removing the old fences?—Yes, I want to make every inch of the land available. Land is too valuable in England to be let lie idle, and I want to get a good return for my investment.

6904. Have you paid much attention to the condition of the Thames opposite your estate?—It is just as it was when I bought it.

6905. Are there any mills upon the Thames near your estate?—No.

6906. Any weirs?—Yes.

6907. At what points?—There is one at St. John's Bridge, another is my lock and weir, and a third about two or three miles further down is called Hart's weir.

6908. Have you entire control over the lock and weir that you own?—Yes, over the weir.

6909. What do you use it for?—To keep up the water to enable boats to pass through.

6910. Do you use it at all for navigation purposes?—Yes; I get my supplies of goods and coals that way.

6911. Do you send any produce from your farm?—No, I do not deal in agricultural produce.

6912. (*Mr. Harrison.*) You get corn?—Yes.

6913. Hay, oil cake, and things of that kind?—Yes; I grow mutton and beef and wool.

6914. (*Chairman.*) You have not paid any special attention to the condition of the river?—The river is in a neglected state, but then I do not go along with the notion of ever being able to make this river available for navigation, because when the East Gloucestershire line is made I cannot see how you can compete with the railway. If I have a load of goods to come to me I cannot be bothered by waiting for this river; I get them by railway.

6915. Is not the river in its present condition liable

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to waste its banks?—The wasting of the banks, I believe, is a myth. I have observed the river for the last six years, and I do not see that there is any difference.

6916. Do you own both sides of the river?—No.

6917. Where does the boundary of your estate run? —I think it is in the middle of the river. My solicitor has told me so, and my deeds, I think, show that.

6918. Is the bed of the river actually vested in you, or is it vested in the commissioners, or in the Crown? —There is no doubt that a water highway belongs to the nation. I have consulted with my solicitor, Mr. Tatham, and I never could ascertain whether the bed of the river belonged to me or to anybody else.

6919. Have you attended any meetings of the commissioners?—No.

6920. Have you been summoned to attend?—I have never qualified.

6921. Do you not think that notice might have been given to you as a large riparian proprietor and as capable of becoming a commissioner?—Yes, but unfortunately our commissioners are bankrupt, and when that is the case everything is neglected; money is the moving principle.

6922. Do you think Government would be justified in putting the Thames under a more efficient conservancy for every purpose?—The navigation of this stream I contend is a thing of the past. With reference to agriculture, I think that the river flooding these meadows is rather a benefit to them than otherwise.

6923. But should not the flooding be under your control; imagine your meadow land with a valuable crop of hay upon it, and a flood coming and destroying the whole crop?—Yes, but I do not mow.

6924. Would a flood that continued for 30 or 40 days upon your meadow in the heat of summer be beneficial?—That is a very exceptional case to put. It is a very expensive process to embank rivers and to make the rivers tributary to you, and deal with them according to your will. I have to ask myself what is to pay for the expenditure, and supposing that I was called upon to pay a rate on my three miles of land, what benefit am I to get out of it to recoup me for the rate I am to pay? I cannot see what the benefit is to be.

6925. As a very large riparian proprietor, you would rather remain as you are than have any new authority set up to improve the condition of the river?—I do not say I would have no authority, but I would rather not pay any money for a thing that I thought would not be any benefit to me.

6926. If an authority is set up it cannot exercise its functions without money, and would it not be fair for you as a riparian proprietor to contribute your fair share?—I cannot see how I am to be benefited.

6927. (*Professor Way.*) If you farmed your land as other farmers do you would be benefited, would you not?—I do not see it. People talk very much about summer floods, but they are so exceptional that I do not think there is anything in it, but there is something in a rate. As for the benefit that I am to derive from any change, I think that is very uncertain, but I know that a tax is certain.

6928. (*Mr. Harrison.*) It has been stated in evidence that the river has been silting up of late years; is that your opinion?—My notion is this, that there are 3,000,000 of inhabitants in London who are interested in the course of this stream, and as for saying that because that stream runs past my land and my cattle drink it, I am to pay for deepening this river to benefit the 3,000,000 of people in London, I think that they may benefit themselves, and if this question comes before the House of Commons you may depend upon it that I will follow it up there.

6929. But do you think that the river has been silting up of late years?—Yes, I think it has.

6930. Does anyone take any steps to remedy that state of things?—No.

6931. If that silting goes on, is it not probable that it will increase the flooding on the adjoining lands?—Yes, I think the river wants attending to.

6932. By whom should it be attended to?—I think that the 3,000,000 of persons in London are very much interested in the stream.

6933. Are not the persons who occupy the adjoining meadows, and who are likely to be more and more flooded by the silting up of the river, also interested in it?—My river land is all under water, but I cannot see what injury I sustain. I do not put my sheep on it. As for the summer floods, if you look into their history I think you will find it is a myth. I have been here for six years, and I have only known of one summer flood.

6934. Mr. Clutterbuck stated in evidence at Oxford that the land here would soak up two and a half inches of rain before the drains would discharge. Does that correspond with your observations?—I think Mr. Clutterbuck was about right.

6935. How many arterial drains have you, and do they all lead to one outfall?—I have generally contrived to bring the drainage of 200 or 300 acres to one point.

6936. Can you state what proportion of the rainfall was discharged by your drains?—I should say that $\frac{8}{10}$ or $\frac{9}{10}$ of the whole rainfall passes through the drains, there is no water that remains on the land.

6937. I believe you have carried out steam cultivation to some extent?—Yes.

6938. Have you observed the effect of steam cultivation in facilitating the discharge of water?—Yes, the water goes plump down with steam drainage.

6939. Have you compared that part with the part that has not been cultivated by steam?—Yes, it is quite different, my steam culture has been very deep: as much as 18 inches.

6940. (*Chairman.*) Do you not think that a rate might be fairly contributed by you and other riparian proprietors for the maintenance of the river?—What I cannot make out is how the riparian proprietors are to be benefited by these improvements. If you throw overboard the navigation I cannot see what any improvement, in an agricultural sense, would be worth. I am speaking now of money, for it all comes to that. I do not see what money I shall put into my pocket.

6941. (*Professor Way.*) It has been stated by a number of witnesses this morning that a proper command over the water would be beneficial to them. Do you differ from them?—Yes. I began with that idea. I thought that by having a command over the floods I could benefit my land very much, but I have not found in practice it is so. I have let the banks go, because I saw that they did not do me any good; they were kept in order for a certain time.

6942. (*Mr. Harrison.*) You have a large meadow, I believe, just below St. John's weir?—Yes, and that is under water.

6943. What is the subsoil?—It is warp.

6944. Is the water that is standing on it now water that reaches it directly from the river, and not from below?—Yes.

6945. (*Professor Way.*) If you were to put sheep on to that land soon after a flood had subsided, would they be liable to rot?—Not in spring; it would be so in autumn.

6946. Would you not be glad to have that land dry now?—I thought so at first, but I do not care a farthing about it now. With regard to the inhabitants of London, what I meant to say was that they should amuse themselves by making a few reservoirs to store the water in winter for the supply of 3,000,000 in summer; that might be done at no great cost.

6947. Where do you think the reservoirs should be made; on the main river or on the tributaries?—I have not gone into that, but I know there is a great facility for making reservoirs.

6948. Of what capacity is the one you are making? —800,000 tons.

6949. What area does it cover?—25 acres.

6950. What is the depth of the embankment?—60 feet.

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6951. What number of cubic yards are there in the embankment?—About 200,000.

6952. Will the cost of it be about 10,000*l.* or 12,000*l.*?—No, I can do it cheaper than that.

6953. (*Mr. Harrison.*) Is it on a branch of the Colne?—No, it is a natural punch bowl. I throw a dam across.

6954. (*Chairman.*) To what height have you got the embankment now?—30 feet.

6955. Have you laid your pipes through the bottom of the bank?—Yes, there is a 10-inch pipe; the slope is 3 to 1 on the inside, and 2 to 1 on the outside.

6956. (*Mr. Harrison.*) What is the area of the gathering ground?—Very small.

The witness withdrew.

Mr. W. B. Wood.

Mr. William Bryan Wood (of Chippenham) examined.

6957. (*Chairman.*) What are you?—A land surveyor at Chippenham. I represent Mr. Hippisley, who is the owner of about 2000 acres of land bordering for two miles on the Thames at Bampton.

6958. How long have you known the Thames in this district?—About 13 or 14 years.

6959. Do you see any difference in the character of the Thames since you first knew it?—That portion of it which I have embanked is certainly better.

6960. What length have you embanked?—On one side of the river about seven or eight miles, and on the other, perhaps, two miles. The inclosure of Bampton and Shilton extended over 3000 acres.

6961. What form and size of bank is it?—The size of the bank there is according to the height; the sides slope between two and three to one.

6962. How high is the bank at its highest point above the surface?—A little over 5 feet.

6963. What are the slopes?—About three to one on each side, taken from the point of the bank.

6964. And what is the width of the top bank?—About 1 foot.

6965. Then you would have the bottom about 31 feet in width?—Somewhere about that.

6966. Is there any ditch on the inside?—Yes, generally.

6967. What width would you give for the bench on the inside between the foot of the slope and the ditch?—It ought to be about a yard. I cannot say that it is so.

6968. What depth is the ditch?—About 1 foot.

6969. What did that bank cost?—The bank cost generally about 70*l.* a-mile.

6970. I have a printed report of the Committee on the inundations of the Thames, this is dated May 6th 1853, will you look at it (*handing the same to the witness*)?—This was written in 1853. My opinion upon some points has been charged from observation since that time.

6971. On what points?—As to keeping up the weirs, and as to the maintenance of the fishing and navigation rights without injury to the land. I am now of opinion that the fishing and navigation rights, and the keeping up of the weirs, would be beneficial to the land adjoining the Thames.

6972. In the report of the Committee on the inundation of the Thames at pages 14 to 17 there is a letter of yours to Philip Pusey, Esq.?—Yes, I did not advocate then widening the weirs or the doing away with fishing rights.

6973. (*Mr. Harrison.*) You pointed out I think that whereas the river between this and Oxford varied in width from 50 to 70 feet the weirs were only from 32 to 37 feet in width?—Yes.

6974. (*Chairman.*) And that the narrowness of the weir tended to flood the land by flooding the river at those points?—No doubt of it, and that the fishing rights enabled parties to pen the water to the high-water mark and so flood the land. I have ascertained from actually levelling the land in the neighbourhood of these weirs that high water mark is up to the level of the adjoining land, and in some places over it.

6975. And consequently a considerable portion of land is water-logged?—Yes.

6976. Do you consider that that area of land so water-logged is reduced in value?—No doubt.

6977. At what depth do you think a stratum of water may be safely kept below grass land, so as not to be seriously injurious?—I find that the height of the river does no injury whatever to grass land, provided it is embanked and interior watercourses are made. I should state that in the Bampton and Shilton inclosure, in the 3,000 acres of land, I made an outfall watercourse, which discharged at Old Shifford, 50 feet wide at the top with a fall of about 10 inches in a mile for 2½ miles, in fact the first half mile was perfectly level at the bottom and the other part of the watercourse had a fall of 10 inches. After traversing a mile and a half the watercourse was divided into two, one 25 and the other 32 feet wide on the top, and with slopes of about 15 inches in a foot.

6978. (*Mr. Harrison.*) What was the width at the bottom?—It would vary according to the height of the land.

6979. Would it not have been a wiser plan to have had the bottom fixed and to have let the top vary with the land?—The top is not cut equally wide throughout, but that is the average width on the top, the bottom was cut of equal width for certain distances.

6980. *Chairman.*) That main drain was cut to benefit the land on either side?—Yes.

6981. And it has answered its purpose?—Yes.

6982. What did that main drain cost per chain in length, and who paid for it?—It was paid for out of the general expenses of the inclosure, under an Inclosure Act.

6983. What was its total cost?—There were several miles of drains made besides that; there were drains from 1 foot to 4 feet wide at the bottom and sloping 15 inches in a foot; one drain made on the other side of the parish to take the top water, the water which came from the highest district, and was discharged into the river at Newbridge.

6984. What was the cost of the whole?—The whole cost of the drainage under the inclosure upon that 3,000 acres of land was between 5,000*l.* and 6,000*l.*; but the work benefited a much larger area; the lands above were benefited to a very great extent as well as those lying alongside of the drains.

6985. But had the 3,000 acres to bear the whole of that cost?—Yes.

6986. Do you think that the work added its full cost to the value of the land?—The land has been doubled in value. I am quite satisfied that in the year 1860 the difference in the produce of the land, compared with what it would have been if those improvements had not been made, was quite equal and more than equal in one year to the expense.

6987. One year's improvement would pay off the whole cost?—Yes.

6988. (*Mr. Harrison.*) The land lets only for 2*l.* an acre?—For from 30 to 40 an acre. Hay was made in the meadows in the year of which I am speaking, when the river was 2 feet above the level of the meadows, and was sold at 4*l.* 10*s.* an acre, and the hay which would have been made would have been sedge grass instead of proper grass if the land had not been embanked. When I first went over those meadows it was after a very flooded season in May, and for 50 acres together you could not see a single blade of grass in those meadows.

6989. What was the value before the improvement?—I cannot exactly say that, but I know, as a fact, that the estates which were bought before the inclosure have been sold for double and some even treble as much as they cost before the inclosure, and I know, from receiving the rents, that the rents have about doubled also.

6990. (*Chairman.*) What interest is charged for that public money which you have taken up?—6*l.* 10*s.*

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6991. In how many years does that repay the capital?—22 years.

6992. What does that leave as the net interest upon the money without the redemption fund?—4 per cent.; it is under the Public Money Drainage Acts.

6993. Could such improvements, in your opinion, be carried out with equal benefit to the landed proprietors throughout that part of the Thames valley, which you know?—Yes, I am quite satisfied, having carefully looked the matter over, that from Lechlade to Bampton the whole of the land lying on the Oxfordshire side of the Thames might be drained, and the Thames embanked, and the whole of the water discharged into the watercourse of which I am speaking. The land might be drained to any depth; the soil is gravel, and a mere watercourse cut through it, without any other under drainage, would be a vast improvement to the drainage.

6994. You would lower the water and bring into cultivation a larger amount of subsoil?—Yes; the drain which I have now made is 7 feet deep at the upper part, so that a watercourse above it could be made to almost any depth which was required, 8 or 10 feet.

6995. (*Mr. Harrison.*) There is abundance of fall in the land?—Yes.

6996. (*Chairman*). Did you hear what Mr. Campbell said with regard to the depth of his drains?—Yes.

6997. Do you agree with him as to the increased depth which would be desirable?—I can only say this, in the drainage of the estate at Bampton I drained from 4 feet to 9 feet deep, and put drains from 9 chains apart to 9 yards apart; the extreme width of 9 chains of course was in gravel.

6998. (*Mr. Harrison.*) Almost every field requires to be studied by itself before it can be drained in an efficient manner?—Yes. 20 years ago I drained 7 or 8 feet deep and it was upon what would be called pretty strong clay, and the improvement of the grass is very remarkable there; the drains have acted well to this time. I have drained a good deal, and I find that, generally speaking, the land is much more porous under 4 feet than it is at 4 or 3 feet; that a greater amount of water runs out from the land. I am now draining 6 and 8 feet deep.

6999. (*Chairman.*) And you get more water out of your drains at the extra depth?—Yes, and I am satisfied that upon grass land draining answers better at a great depth than at a shallow depth; in the one you often lose weight in the crop, in the other you get nearer to the condition of a naturally dry soil. In course of time I believe that I should go much deeper than I do now.

7000. Would shallow or deep drains sooner get out of order by choking?—Shallow drains get out of order much sooner than deep drains.

7001. They are more liable to be choked by silt or vegetation?—Yes.

7002. (*Professor Way.*) By the roots in fact?—By the roots of grasses.

7003. (*Chairman.*) By a deep drain you get a clearer filter?—Yes.

7004. And a purer water?—Yes.

7005. (*Mr. Harrison.*) What is your opinion as to the effect of drainage of land for agricultural purposes on the summer supply of water to a river like the Thames?—My own opinion is (of course it is but an opinion, for we have not ascertained facts to guide us) that under drainage would afford a more regular and constant supply than a state of nature.

7006. I presume that from clay lands, you would obtain no supply of water at all in a dry summer without drainage?—No.

7007. Nor probably with drainage?—Just so.

7008. So that all clay lands may be put on one side?—Yes.

7009. Medium loamy soils might be put in the same category,—they would retain the power of running for a long period, but they would not run in extremely droughty weather?—No, except with a deeper drainage than 4 feet.

7010. A great part of the area of the upper Thames which is oolitic remains undrained?—Yes, so far as I know of that country.

7011. Before drainage is carried out would an area of waterlogged land supply anything material to the river, or would the moisture chiefly go off in evaporation?—Exactly so. After the water had run to the surface it would remain there, it could not get into the river.

7012. It would evaporate and would keep the land cold and wet?—Yes.

7013. Therefore any drainage of such land would rather drain water to the river than be the means of abstracting it, in a very droughty summer?—Yes I have not the slightest doubt of it, because I have facts to prove it in the shape of several drains which are running all the year round.

7014. Does that afford a supply to the river which did not exist before that drainage was carried out?—The water could not get into the river except under those circumstances which I have mentioned.

7015. What is your opinion as to the propriety of putting the river under one management, and improving the adjoining land, and of subjecting the land to a tax for that improvement?—It would be very fair to tax the land for the improvement; and, I think that the land would be very glad to bear it. I should as a landowner.

7016. Would you tax merely the land subject to flooding, or also the land benefited by the land drainage?—All land benefited by an increased outfall should bear a proportion; of course the rate should be according to the degree of benefit.

7017. Then would it be fair to tax Mr. Campbell, if it was proposed to carry out an improvement of the river?—A very small portion of his estate would be benefited, or I think affected by anything which was done to the river.

7018. You heard him say that when the railway was carried past Lechlade, there would be no advantage in maintaining the river navigation; do you agree with him in that?—My own impression has been that it would be useful to the land owners always to keep open the navigation if it could be done without much cost.

7019. What is the distance between Lechlade and Oxford?—About 28 miles.

7020. Is there not a considerable extent of land, with no insignificant population on each side of the river between Lechlade and Oxford, which is at a distance from any railway communication?—Yes. As far as I am interested as a land owner, I should say, keep open the navigation; that is my decided view of it.

7021. Might the navigation be kept open in connection with the improvements to the adjoining lands, and become a source of emolument so as to ease the charge which would otherwise come simply upon the shoulders of the landowners?—I very much doubt there being much profit from the navigation; it would be a convenience, I think, and in some cases a considerable convenience. It is an easy way of getting coals up, for instance; a good deal of coal is brought up as far as Newbridge, and I have no doubt that if the river were in a better state more boats would go down this way, but they are occasionally stuck in the river.

7022. (*Chairman.*) Would you advise the abandonment of all weirs and mill-dams, and the restoration of the river to its primitive state?—Certainly not. I should advise that the weirs be improved and kept up and made applicable to irrigation of land.

7023. If all the weirs were allowed to go to decay, cannot you conceive the river ceasing to form a boundary to estates, and a child being able to walk across it?—Yes, I have so expressed myself in writing. In winter every obstruction should be done away with, so as to allow floods to get down, and in summer the water should be kept to a certain height.

7024. And you could construct sluices under proper control which would lower the head of the river,

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and never let it get very much above the ordinary level of the weir?—Yes.

7025. You could have a water way through the weir capable of taking any excess of water without flooding the land?—No, you could not do that with this river; the river Thames, as far as I know it and have levelled it, is above the adjoining land, the land falls inland from the Thames bank in some cases half a mile and even further than that, and directly any extra water comes into the Thames it must naturally run over the banks and run into this low land, but by confining it by banks on each side for a sufficient distance apart to take the flood water you gėt a perfect control over the water, and it is a matter of absolute indifference to the land on each side whether the flood is half a foot higher or not, so long as you have a sufficient bank. But you want to get the water not too severe upon the banks, and that might be done by easing the weirs.

7026. If you could lower the flood 2 feet you would put 2 feet less strain upon the banks?—Yes, but it would be a disadvantage to lower the flood water too much because you would lose the power of throwing it over the land in a large quantity.

7027. (*Mr. Harrison.*) It is mentioned in the return which we have that the level of the high-water mark at St. John's lock is 5 to 6 inches below the surface of the land, at Buscot 4 inches below, at Hart's weir about 6 inches and at Lower Hart's weir about 6 inches. Would these levels be mischievous if the river were properly regulated?—It would be advantageous to lower the high-water mark, the fishermen take advantage of it; there is no occasion for its being so high.

7028. (*Chairman.*) Perhaps you think that it would be an equal advantage to dredge or deepen the river in the reaches?—It would be an advantage to lower the reach generally; artificial embankments themselves tend very much to scour out the river; the river is very much improved between those banks.

7029. When you confine the stream by new embankments you concentrate it upon the bottom and this tends to preserve a deeper river?—Yes, it makes a greater scour; you get a greater rapidity of current.

7030. (*Mr. Harrison.*) When the water has passed a part so embanked and comes to an unembanked part how does it act? The river if it has scoured out something from its bed above has to carry that forward, what becomes of it?—I cannot say what becomes of it.

7031. Is it not probable that when the water diffuses itself below the embanked part it would lose the velocity which gave it its scouring power and deposit that mud and lessen the depth of the water below?—I do not think that an embankment would produce that result.

7032. Should not a system of embankment be carried out upon a general plan, if at all; for instance, throughout the whole course of the river between this and Oxford?—Yes.

7033. (*Chairman.*) Do you know anything of reservoir making upon a large scale, such as the great reservoirs made for waterworks?—No.

7034. You do not know whether there are sites in any of the villages adjacent to the tributaries of the Thames where such reservoirs could be constructed?—Between this point and Oxford I should say that there is nothing of the kind.

7035. (*Mr. Harrison.*) When you get upon the hills amongst the tributaries, do you not get upon the porous strata of the oolites?—Yes, in the Gloucester direction.

7036. That is the direction in which you would get deep valleys?—Yes.

7037. Reservoirs up those valleys would hardly be watertight?—I should think not.

7038. Are there any other points upon which you can give the Commissioners information?—My general notion of the improvement of the Thames is that a system of embanking and interior watercourses could be carried out to the very great advantage of the landowners; that the Thames should not be made a drainage watercourse at all. The Thames is not adapted for draining into excepting by interior watercourses, brought into it at a considerable distance below the land which they drain. The Thames, on the other hand, is very much adapted for irrigation purposes, and by irrigation the land might be doubled in value in many instances.

7039. What regulations should there be as to the abstracting of water for irrigation purposes?—There should be a power to keep the water up to a certain height; weirs for irrigation and outlets should only be made under the sanction of a properly constituted board; the outlets should be of a small size, so as not to let pass a sufficient volume of water to flood the interior land.

7040. As below Oxford, weirs are formed and pen up the water for the use of the navigation through pound locks on the one side, and for the use of mills on the other, so above Oxford you would have weirs with pound locks for the navigation on the one side, and facilities for letting out the water to irrigate the land on both sides?—Yes; I would have the weirs above Oxford enlarged and improved: I may add that the embankments should be kept at a regular distance from each other and should run in parellel lines. I say so because embankments are now being carried out close to the side of the river, and at right angles across each other.

The witness withdrew.

Mr. G. T. Williams.

Mr. George Thomas Williams (of Buckland) examined.

7041. (*Chairman.*) What are you?—Land agent to Sir William Throckmorton.

7042. Does any portion of his estate border on the Thames?—About 2 miles.

7043. Does he own land on both sides of the Thames?—Only on one side.

7044. Is any portion of it liable to be flooded?—Yes, between 400 and 500 acres would be influenced by a flood; about 200 acres would be flooded.

7045. Are there any special points which you wish to mention?—As regards irrigation I have not had any particular experience of it myself, but we have a tenant now who has done a great deal of it, and I certainly must say that I see a vast improvement by the irrigation.

7046. (*Mr. Harrison.*) By irrigation under control?—Certainly.

7047. (*Chairman.*) By whom have the improvements been carried out?—By Mr. Wood, under the Wadley inclosure.

7048. You heard what he said as to the form which the embankments should take, that they should not follow the curves of the river, but should enclose the bends and go in parallel lines, irrespective of the small curves?—I quite agree with Mr. Wood in that respect.

7049. Otherwise you would have large areas of land in some points which would be altogether left under the influence of the floods?—Yes, certainly. I believe that an embankment of that sort is of very little use, for I have been told this very morning that the embankment where it has been carried round the crooks of the river has been washed away and has ceased to be a protection. I believe that where a large curve is so cut off by an embankment, the land within it is doubled in value in a very short time; it is improved by the water coming over it, and leaving the silt behind. I should advocate lowering the sills of the weirs and widening the weirs, we should get the water more under our control; I should also lower the high-water mark for the very reason which Mr. Wood has stated.

7050. Would you cleanse the river from the weeds and so on?—Yes, and clean out the little islands.

7051. At whose cost should it be done?—The cost

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should fall upon the land. I believe that the year 1864 has paid the whole of the expense of the Wadley inclosure, or Sir Wm. Throckmorton's estate, so that I do not think that it is a very great hardship to impose the cost upon the landed proprietors.

7052. Do you know how the present board of commissioners is constituted?—No.

7053. I suppose that you know that there is no active superintendence exercised over the Thames?—There has not been for many years; 10 or 12 years ago we used to have men come up from Oxford and ballast and do up all the towpaths and weirs, but for years I have not seen it done.

7054. Have you anything further to mention?—I agree that a general embankment of the river would do a very great deal of good. I can only speak from what we have actually experienced in our own parish. In the year 1860 we lost all the hay crops, and the value of the hay and grass which was lost that year would I believe more than pay for the whole of the expense through our parish.

7055. (*Mr. Harrison.*) Considering that there is not a railway parallel with the Thames to any great extent between Oxford and Lechlade, do you think that the restoration of the navigation would be beneficial to the land on each side of the Thames between Oxford and Lechlade?—The navigation would not do a great deal of good. The railway from Oxford to Witney, and by Bampton through Lechlade would be too near the Thames. There are very few villages between the railway and the river.

The witness withdrew.

THOMAS H. SOUTHBY, Esq. (of Carswell), examined.

T. H. Southby, Esq.

7056. (*Chairman.*) To what points do you wish to speak?—I simply wish to confirm what Mr. Williams and Mr. Wood have stated. My property is in the same parish and is benefited by the same embankment. Before the embankment was made we had a good deal of meadow under water, and I see to-day that my meadow is all dry.

7057. And you agree with these gentlemen that the embankment is worth the money that it has cost?—Certainly.

The witness withdrew.

Mr. HENRY RUCK (of Eisey) examined.

Mr. H. Ruck.

7058. (*Chairman.*) Do you farm on the banks of the Thames?—Yes.

7059. What number of acres?—640 acres.

7060. Who is your landlord?—The Earl of Saint Germans.

7061. Is your land situated on both banks or on one only?—On one only.

7062. What acreage have you within the influence of the river?—500 acres.

7063. The river is liable to flood that quantity?—It has been liable to flood about 200 acres.

7064. Has that 200 acres been embanked?—There is a bank round the Thames.

7065. Have you made certain improvements on the river opposite your land?—Yes, there has been a good deal done.

7066. What have you done?—There was a public meeting of the proprietors and occupiers of land adjoining the river Thames held at the White Hart Inn in Cricklade, on Friday the 19th of August 1854, for the purpose of receiving the report of the committee and of deciding on such measures as might be thought requisite for the cleansing of the river. I should say a previous meeting had been held, and had come to the conclusion that every proprietor and occupier of land should be asked to do his part in cleansing the part of the stream adjoining his estate, and when the committee were called on to report what information they had obtained since the last meeting. Mr. R. A. Iles thereupon stated that, unless the proprietors and occupiers removed the obstruction to the free course of the water, other steps would soon be taken compulsorily to cleanse the whole bed of the Thames; and he also stated that below Ham weir, where the Thames was properly cleansed, occupiers had not suffered from the late floods.

7067. Was action taken after that meeting?—No; one owner of land was summoned before the magistrates for not cleansing the Thames opposite his property. I took the case up myself, but it fell through.

7068. Was that under some Act of Parliament?—Yes, this is the proper legal notice which was given (*producing the same*).

7069. (*Professor Way.*) Through what means did you set the law in action; did you apply to the commissioners?—Yes, I applied to Mr. Barker, the chairman, and he said that the Thames was no longer used as a navigable stream beyond Lechlade, and that therefore they would not use any power—although the old Act of Parliament giving the commissioners the control of the navigation beyond Lechlade might not have been repealed.

7070. (*Chairman.*) This notice states that the Act of Parliament, 10th and 11th Victoria, chapter 38, section 14, authorized the proprietor or occupier of any lands sustaining injury by the neglect after notice of any other occupier of land to maintain the banks or cleanse the channels of any stream forming the usual outfall from the lands of the proprietor or occupier so injured, himself to execute or cause to be executed the necessary works of reparation or cleansing, &c., and to charge the person so neglecting with the costs and expenses of such works."

7071. What other points have you to state?—I think that one of the reasons why the streams of the country are not cleansed, is because they form the boundaries between lands belonging to different proprietors; in many cases a stream is allowed to get into a bad state on purpose to pen the water and thus try to prevent the neighbour's cattle from trespassing. If there were a proper fence it would remove the chief objection to cleansing the river.

7072. Would not a general conservancy board exercise the power of compelling landowners to cleanse the river opposite their property more advantageously than individuals?—Decidedly.

7073. (*Mr. Harrison.*) Your endeavour came to nothing. Did you drop the subject or did you take any steps to improve the river opposite your own land?—I myself kept the river cleansed from weeds and trees and anything of that sort twice or three times a year, for 13 years, for 3 miles.

7074. Did you do anything towards dredging the river opposite your land?—Yes, many thousand loads of mud were thrown out.

7075. Was it pretty effectual?—It was only done last October twelvemonth and I have only 30 or 40 acres of land under water now instead of 200 which I should have had.

7076. Then your experience of the effect of widening and deepening the channel is that it is clearly beneficial to the land?—Decidedly so.

7077. (*Chairman.*) Have you anything to add?—I think that a very small area of land is benefited by the flooding of the Thames.

7078. (*Mr. Harrison.*) You occupy, you say, 600 or 700 acres of land; 200 acres of meadow land were formerly subject to flood and now are free from flood; is it not the fact that the change is beneficial not only to the 200 acres so freed from flood, but also to the rest of the farm which you occupy, in stocking and in other ways?—Yes, and not only to the farm which I occupy, but to many others in the same district.

The witness withdrew.

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Mr. JOHN GANTLETT (of Water Eaton, Cricklade) examined.

7079. (*Chairman.*) What are you?—A farmer.

7080. Do you farm on the banks of the Thames?—Yes.

7081. What area have you influenced by the Thames?—The whole of the farm is influenced by the Thames more or less, but we have very little damage from floods. The grievance which we complain of is the back penning of the water which stops the drainage.

7082. By whom is it stopped back?—It is in consequence of the river not being properly cleansed out further down.

7083. The neglected state of the river below you does not allow the water to fall sufficiently to drain your land?—Yes, our land is very flat and low; it is very little above the bed of the river. There was a great outlay a few years ago to drain the estate; but in a wet time there is very little use in it on account of the back penning of the water; the watercourses are penned up.

7084. Even the land drains which you have put in get waterlogged?—Yes.

7085. And therefore you have not received the benefit from them which you would receive if the river was put in proper order, as it might be?—Yes.

7086. Is the river worse than when you first knew it?—No, it is better a good deal. Last year there was a great deal done to the river for about a mile below me, which greatly improved it; and had the improvement been carried on further down it would have taken the water off in a great measure.

7087. Would the benefit of clearing out the river be fully equal to the cost?—I should think so.

7088. You have heard the evidence, I suppose, with regard to the effects of banking and cleansing?—Some of it.

7089. Do you agree with Mr. Ruck generally?—Yes.

7090. (*Professor Way.*) Can you form any notion about what quantity of land, say from this point to another point six miles down the river, would be benefited by an improved state of the bed of the river?—The main of the land all the way for six miles down would be improved.

7091. I mean by a better outfall for the drainage dependent upon a better condition of the river?—Yes, but my opinion differs from Mr. Ruck's in some respects. I think that if some of the land was not flooded it would not be so good as it is now. My grievance is that we cannot drain the land.

The witness withdrew.

Mr. H. Ruck.

Mr. HENRY RUCK further examined.

(*Mr. Ruck.*) I have had about 400 sheep rotted in two seasons.

7092. (*Mr. Harrison.*) Was that before you improved the land?—It was in 1852 and 1854 I think. I have many times had my hay swept away from the land.

7093. You have had no sheep rotted since you improved the land by widening and deepening the river?—I have not.

7094. Can you turn young stock on to the land which you have now improved, in the autumn, with safety?—My land which I have improved is drier. I can ride over it dry, whereas before it would have been under water.

7095. What would have been the effect upon young stock of being turned on to the land in its former wet condition in autumn?—We never could keep them on after about the 11th of October, unless it was a very dry season.

The witness withdrew.

Mr. J. Gantlett.

Mr. JOHN GANTLETT further examined.

7096. (*Mr. Harrison.*) Do you agree with Mr. Ruck in his answers to those questions which have just been put to him?—Yes, generally.

The witness withdrew.

Rev. R. Rice.

The Rev. RICHARD RICE (Rector of Eaton Hastings) examined.

7097. (*Chairman.*) What have you to state to the Commission?—I have built a house within a hundred yards of the river, and I have now a foot of water in my beer cellar and in my wine cellar. In the summer the river is so very low and full of weeds that we cannot use the water for bedroom purposes, or in any other way. Last summer two of my sons pulled their trousers up just above the knee and waded across the river.

7098. Do you think that the river is fouler than it used to be?—Very much in the last three or four years.

7099. And that the weeds have grown ranker and impeded it?—Yes, opposite my house.

7100. Do you think that the floods rise higher?—No, but the river is now so full of weeds that no skiff or anything of that sort can be used.

7101. Does the flooding occur by the water rising through the subsoil or by rising above the surface?—It rises up through the subsoil.

7102. Then before this can be improved the bed of the river must be lowered?—Yes.

7103. The floods would have to be kept down lower than they now rise to?—Yes, by establishing a more open course for them.

7104. (*Mr. Harrison.*) Was the foul condition of the water of which you complain from the decaying vegetable matter in the river?—Yes, in summer it is very offensive.

7105. (*Professor Way.*) When the flood subsides from your cellar does it leave a bad smell?—No, not at all.

7106. Are you of opinion that the river should be put under proper management?—Yes; there is nobody now to look after anything. Many years ago I met the commissioners, and Mr. Barker said, "If we "can have sufficient space for navigation that is all "we care about."

7107. (*Chairman*) Are you a commissioner as rector of Eaton Hastings?—Yes, and I have property there also.

7108. Have you ever served upon any of the committees?—No, I never heard of a committee being held in this part of the county.

7109. Did the officers of the commissioners never write to you when an officer was to be appointed?—Never.

7110. Were you never petitioned to attend to vote for a certain person?—Yes, I voted for old Mr. Graham the first time that he came in.

7111. But they never summoned you for any other form of business?—None whatever; I think that only three men came down with Mr. Barker at the time when the boat came up and down.

The witness withdrew.

LECHLADE.

Mr. J. Basson.

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Mr. JOHN BASSON (of St. John's Pound Lock) examined.

7112. (*Chairman.*) You are the pound keeper at St. John's lock?—Yes.

7113. You have replied in writing to certain queries which have been put to you?—Yes.

7114. Will you look at that paper (*handing a paper to the witness*). Do you think that that is a copy of your replies?—I think that it is. (*A return made to the general surveyor in March 1865, containing certain questions, the answers to which were given by the witness.*)

7115. How long have you been pound keeper?—Over 14 years.

7116. What are you paid for a flash?—We charge by the ton, 2*d.* per ton.

7117. What tonnage does a barge generally draw?—It is according to the water. The least that I have known go down I should think is six tons.

7118. That would be a shilling for a flash?—Yes, and I have taken for over 30 tons for the St. John's pound lock, and also for Buscot.

7119. (*Professor Way.*) Is that for passing the lock or for a flash?—That is only for passing the lock; it has nothing to do with the flash.

7120. (*Chairman.*) Are you paid wages?—Yes, by Mr. Castle, the surveyor.

7121. You are a servant of the Thames Commissioners?—Yes.

7122. (*Mr. Harrison.*) To whom does the weir at St. John's lock belong?—Mr. Edwards is the renter of it.

7123. (*Chairman.*) Is there sewage passed into the river anywhere above you?—Yes, at Lechlade.

7124. You say that persons drink the water from the river below you?—Yes.

7125. Who uses it for drinking?—All of us below here.

7126. Did you hear what the reverend gentleman said, that last summer it was so bad that they could not use it even for washing in the bedrooms?—Yes.

7127. But you drink it?—Yes, we are obliged to do so.

7128. Have you ever known person made unwell by drinking the water?—No, I never heard tell of it.

7129. The sewage which is spoken of from Lechlade I suppose is merely the washings of the surface of the streets?—Yes.

7130. Do you do anything to the river in the shape of cleansing it from weeds?—No, I have only to attend to the boats and to take the tolls.

7131. What number of boats now come through upon the average?—I might get two in a month.

7132. What number used to come through when you were first appointed there?—I have had as many as 20 in a month.

The witness withdrew.

Mr. W. T. Hart.

Mr. WILLIAM THOMAS HART (of Buscot) examined.

7133. (*Chairman.*) You are the tenant of Campbell's weir?—Yes.

7134. How long have you been there?—Two years.

7135. What do your duties consist of?—I am the renter of Mr. Campbell's fishery and I look after his weir for him.

7136. What do you catch there, eels?—Yes, and all kinds of fish.

7137. Do you rent the weir and sell the fish? I rent the fishery, but he has the tolls of the weir. I rent the fishery at Buscot and Inglesham.

7138. What rent do you pay?—15*l.* for the fishery at the two places, and I take the withey beds as well. I pay about 22*l.* a year for the withey beds.

7139. How many hundred weight of fish do you catch in a year?—I cannot tell; it has been a very bad season these two years for that.

7140. Have you any power of taking payments from persons fishing with a rod and line?—Yes, 2*s.* a day for trawling and 1*s.* for angling.

7141. Have you many of those customers?—No.

7142. That enables you to pay the rent?—Yes.

7143. Is the river free from weeds?—It is pretty full of weeds, but I consider that a benefit to the fishing.

7144. You would not like the weeds taken away?—I should not like it, but other persons would; the boatmen would like it.

7145. (*Mr. Harrison.*) Have you more fish or less than you had some years ago?—There has not been much difference in the last five years, but I think that there used to be more eels than there are now.

7146. (*Chairman.*) You do not think you could afford to pay 30*l.* for the fishery?—Not at the present time.

7147. Have you anything further to state?—There is one thing that I have to complain of respecting the weeds; the people higher up the river cut the weeds and do not take them out, but let them come down the river, and it becomes a great nuisance for all of us who have locks and weirs; we have to be up day and night.

7148. (*Chairman.*) Do you pull them out or send them through the lock?—We pull them out as fast as we can.

7149. Are they of any use for manure?—Very little; it takes a lot of weeds to make manure.

7150. (*Professor Way.*) If you find people cutting the weeds do you stop them?—I made a complaint two years ago, and even this last year Mr. Campbell wrote that he should not allow them to be cut.

7151. (*Mr. Harrison.*) Is it not sometimes the case that these weeds come down and become entangled in your lock so that you cannot free them, and they are the cause of a flood on the adjoining land?—Yes. I have known them completely stop the water in summer time so that we could not pass any boat or fishing punt, or skiff or anything else without great trouble. Last summer twelvemonth the river was completely blocked up at the bridge so that I could not pass anything at all; it took me two days to cut the weeds and get them away, and those are the weeds which come down from above.

The witness withdrew.

Mr. E. Edwards.

Mr. EMANUEL EDWARDS (of St. John's Bridge Weir) examined.

7152. (*Chairman.*) Have you heard the evidence of the last two witnesses?—Yes.

7153, Do you agree with them as to the evil of these weeds?—These weeds are a great nuisance to all parties below. I do not mean to say but what it is a great benefit to people above to pass them down. At Hannington Bridge several people have walked right across the river on the weeds. The weeds are a special nuisance to anyone who has weirs; he is forced to be up all night, and then when they go down beyond they get on the flams and catch the mud, and fill up the river. Since my remembrance (I have been bred up by the river from a child, and I am now about 35), the river is in a much worse condition than it was. If the river was entirely cleansed out it would be a great benefit to farmers.

7154. If weeds are cut they ought to be got out?—Yes, by some means; it is difficult to get all out, but a part might be got out by extra trouble. I think that every one who cuts weeds ought to get them out on to his fields, and to make them into manure; it would cause a great deal more expense at first, but it would be a less expense in the end.

7155. Suppose that the weeds were not cut?—Then they would get into mud.

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7156. The river bed would get higher and higher ?—Yes.

7157. And the weeds would get higher and higher ?—Yes.

7158. (*Mr. Harrison.*) Do you find that weeds grow more luxuriantly in deep or in shallow water ?—In shallow water, on flams.

7159. If the river were formed into good deep reaches there would be comparatively little growth of weeds at all ?—There would be hardly any weeds for several years; a little expense every season would keep the river clean, and in deep water the weeds would never want cutting.

(*Mr. Hart.*) The cutting of the weeds which blocked up the river at Inglesham every year caused a great stench and so polluted the water that the person at the Round House could not drink it.

The witness withdrew.

Mr. J. Pinniger.

Mr. Joseph Pinniger (of Lechlade) examined.

7161. (*Chairman.*) What are you ?—A farmer. I have land above the Thames by the side of the river Colne.

7162. What is its condition there ?—The Thames being in so bad a state pens the water of the Colne up sometimes, so as to stop our drainage.

7163. And to flood the land ?—Yes, it is principally the drainage which is affected, the back ditches are stopped.

7164. The land is injured ?—Yes.

7165. If the Thames were put into a better condition you would have a better fall for your drainage ?—Yes, it would be a good deal better.

7166. Who do you think should improve the Thames ?—The occupiers of the land and the commissioners. A good deal of traffic would come to Lechlade if the Thames were put in a proper condition; as it is a great deal of corn goes from Lechlade and other places by the river.

7167. If the navigation were improved, it would be a benefit to the town ?—It would be a benefit to the town. It would also be a benefit to the land if the weirs and locks were put in good condition. The locks are in a very bad condition, and as a consequence the weirs have to be shut a great deal longer than would otherwise be necessary. If the weir below us was only shut for a limited time the water would be out of our brook so much sooner, and the drainage would be better.

7168. Do you know anything about the present commissioners ?—No.

7169. But you know that the Thames is neglected? —Very much.

7170. Is it worse than it was when you first knew it ?—A great deal worse.

7171. And it is gradually getting worse ?—Yes.

7172. Do you agree generally in what has been said with regard to embanking the water off the land ?—Yes, there is a good deal of land in our parish in small holdings, which it would be beneficial to embank, and some of the house property in our parish would be a good deal improved; in some parts the water is now up to the level of the floors of the houses.

7173. Do you think that that causes any disease ? —No, I do not know that it does.

(*Mr. Powell.*) Although it is a damp part of the town it is freer from fever than other parts of the town, which fact is almost an amazement to me. With the exception of one outbreak I only remember isolated cases of disease there for 25 years.

7174. (*To Mr. Pinniger.*) Do you know Lechlade pretty well ?—Yes, I was bred there.

7175. Are there any waterclosets?—(*Mr. Powell.*) Yes, there are some. I can answer for 12 or 15.

7176. Do the privies enter into cesspools or drains? —Into cesspools, I believe, invariably. I do not think that there is a watercloset or a privy in this whole parish which empties into the sewers.

7177. What flows into the Thames is the surface drainage of the streets ?—Yes, and just the slops of some of the houses, nothing more. I have looked after these matters and I am sure that there is not a privy which is not at times cleared out and the contents made use of on the land.

7178. Is the water supply of the town obtained from wells ?—From wells, almost invariably fed by the little Farringdon springs.

7179. Is any of it got direct from the river ?—No.

7180. (*Professor Way.*) Is the water laid on ?—Not at all, there are a few springs in the parish and they are never exhausted in the hottest and driest season.

The witness withdrew.

J. H. Taunton, Esq.

John Hooke Taunton, Esq. (of Brimscombe Port), examined.

7181. (*Mr. Harrison.*) You are a member of the Institution of Civil Engineers?—I am.

7182. And the engineer of the Thames and Severn canal ?—I am.

7183. You have been so for some years ?—For upwards of 13 years.

7184. We have had it in evidence to-day that one cause of the diminution in the traffic upon the upper part of the Thames is the difficulty of getting boats along the canal, that whereas the land used to bring upwards of 30 tons of coal it now can only bring 16 tons from want of water at the summit level, is that the case ?—Not exactly. Since we have had competition with the rail the quantity of coal which used to be necessarily brought by water has ceased to be required. In former days coal was bound to be taken over the land in winter time, whatever might be the price, and although the water at the summit level might be low, I do not think that there has been any practical diminution in the depth of water at the summit level; it has always been a bad summit, and it is so still.

7185. You pump water from Thames Head to supply it ?—That is the main source of supply.

7186. From the return which you gave me, you pump about 20,000,000 gallons a week in a dry season? —In round numbers we pump 2,000 gallons a minute from the Thames Head springs. We are also able to obtain a supply from the Churn.

7187. What becomes of that water, the quantity which you use for the navigation for passing barges through locks east and west, I presume must be small ? —It varies of course with the trade.

7188. But it is small when compared with the quantity which you actually pump ?—It is; there is no doubt that a good deal is lost. I have frequently had occasion to consider the matter with reference to remedial measures, and I am quite prepared to state that the quantity lost by leakage and soakage (which is a worse thing than leakage) is very considerable indeed.

7189. In what stratum does that leakage and soakage occur ?—We find it work in this way—full summit level is 5 feet. The quantity of water which we aim to keep, is 4 feet 6, but we find that when a dry time sets in, between the range of 4 feet 6, and 3 feet there is a very considerable leakage which we cannot possibly stop in the sides of the canal; I say leakage, but it is more properly soakage.

7190. (*Professor Way.*) It is not in the lower part of the bed ?—No, when we get 3 feet down we can hold the water, and now that it is an object with us to maintain our competition with the railway, we aim at keeping the 3 feet. Of late years we have suc-

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ceeded in doing so, having puddled a great part of the canal, and having paid a considerable sum for water from the Churn.

7191. (*Mr. Harrison.*) Does the water which escapes, pass into the Great oolite?—It does.

7192. Then that leakage and soakage sinking into the oolite would, I presume, either come back to your pump or rise at some of the springs flowing into the Thames?—Most probably it would rise at some of the springs flowing into the Thames. I do not think that it would come into the pump, because the pump is near the west end of the summit level, and we have 5 miles of summit level beyond; and also because the dip is from the other way, from west to east.

7193. (*Professor Way.*) And you may have all sorts of faults?—Yes.

7194. (*Mr. Harrison.*) Although you pump so large a quantity for the supply of your summit level, a great part of that is not wasted to the Thames, but finds its way back again in some other direction?—Quite so.

7195. (*Professor Way.*) It does not get into the Severn?—The dip is not in the direction of the Severn; but you know, as a geologist, that faults quite upset all calculations. I can give an instance of it. Boxwell springs, which are the main source of supply to the Thames above here, are developed by a fault; and when you see such a result as that which evidently has immediate connexions with the fault,—the water coming up through the fault,—it is obviously impossible to trace the course of water generally in this locality where you have so many faults.

7196. (*Mr. Harrison.*) You laid out the works for the supply of Stroud with water?—Yes.

7197. From what source?—Stroud is supplied from two sources. There are two levels, one for the lower part of the town, and the other for the upper part; the springs supplying the lower levels are the springs thrown out by the upper lias sands which I believe lie some 150 feet above the lower parts of Stroud; the springs rise at a place called Gainey's well in the valley by the church, and are led from there to the lower part of the town to a reservoir near the Cross, and from that reservoir pipes supply the town. The upper part of the town was without a proper supply, and I was consulted with reference to obtaining a better one. My idea was to obtain it from the top of the fuller's earth, acting on the notion that the fuller's earth was practically impermeable to water and that upon it I should be able to catch all water falling through the great oolite. I determined to run contour lines of drains at the side of the hill at Kilmester's farm, just at the level of the top of the fuller's earth, and to collect the water and lead it to the reservoir. We very quickly got a great quantity of water, but we found that so soon as the land was drained the water fell off and ran itself dry, altogether it was a very unsatisfactory supply I was then led from observations which I made at the time, to try another course, and that was to drive in headings starting in the fuller's earth, and inclining rapidly to the top of the fuller's earth at the side of the hill. This plan answered, but I found that the main springs were in a vein of shale in the fuller's earth and not at the top of the fuller's earth.

7198. From that source you get an abundant supply?—A sufficient supply.

7199. (*Professor Way.*) Was there a good deal of sulphate of lime in it?—Not a great deal of sulphate of lime, but it was a bad water. Dr. Volcker analysed it, and we submitted the analysis to Mr. Rawlinson at the time that we applied to the Government for money, and it was just passable, it was the best which we could get at that level.

7200. (*Mr. Harrison.*) You have paid great attention during the investigation of questions of water supply to the quantity of water passing down the tributaries to the Thames?—Yes, and in the Thames. I have gauged the Thames here.

7201. Can you give us any information upon that subject?—The level of the Thames at Cricklade, as taken from my own level, is 256 feet above ordnance datum. At the same time I took the level of the canal at Cricklade, and, according to that, the level of the Thames at Lechlade would be 234 feet in round numbers. I have also computed the drainage areas of the principal tributaries to the Thames. The Churn is 64 square miles; the Colne 86 miles; the Thames Head and Swill brook 75 miles, and the Ampney brook 25 miles, making altogether 250 square miles. I have also made out in figures the quantity of water which would result from a calculation of the water shed and the quantity which is actually found by gauging. The annual rainfall in this country may be taken at from 27 to 30 inches.

7202. (*Chairman.*) That is the average?—Yes, from my own observations for 13 years, but I have had access to other rain gauges extending over a longer period.

7203. Do you know what the least fall has been in any one year?—Yes; the least fall was in 1854, and in 1864, in round numbers from 19 to 20 inches.

7204. And your highest would be about 40 inches?—Yes. Now of these 27 inches of actual rainfall in the district of the upper Thames, the amount available for purposes of navigation, may, I think, be safely taken at from 8 to 10 inches. That is the quantity running off into the river Thames; the rest passes off as floods, and may be rejected for the purposes of our calculation. Now I find by Beardmore's Tables that for one square mile of drainage area and 8 inches of rain per annum you get about 35 cubic feet of water per minute; we then, from 250 square miles of drainage, should get about 8,000 cubic feet of water per minute.

7205. (*Mr. Harrison.*) Do you mean that as a constant throughout the year?—No; the perennial flow of the Thames; the summer flow, not the minimum flow.

7206. (*Chairman.*) The minimum dry weather flow ought to be about half a cubic foot per second from each 1,000 acres?—That is 4,800 cubic feet per minute. The object of my evidence before you to-day is to demonstrate that there is amply sufficient water in the Thames at this place for maintaining any amount of navigation which can pass over it, and that it is most favourably circumstanced for the purposes of navigation.

7207. (*Professor Way.*) You mean supposing that the Thames were well canalised?—Quite so; that the Thames possesses the necessary elements of a most valuable navigation.

7208. We want to get information as to the quantity of water for water supply?—That would come to the same thing. In March 1854 I was employed on an examination of the river Colne. This led me to getting at what I considered a fair average estimate of the volume of the river Colne at Fairford which is some little way above its point of junction with the Thames. On the 22d of March in that year I took a gauging myself very carefully and made the flow to be 4,700 feet of water per minute. Now compare this with the flow during the extreme drought of 1864.

7209. (*Mr. Harrison.*) What did you find it in 1864?—I did not take that gauging myself, but I sent a most reliable person who had assisted me in all the other gaugings. I should here observe that the Colne could only be gauged on a Sunday or some fair day, or day of general rejoicing, when the mills were not at work. There is always extreme difficulty in gauging a stream such as the Colne which is full of mills, because they are pounding at one mill and working at another. It is very likely that when I took the gauging in March 1854 the mills were at work, but the quantity then was so large that anything done at the mills might be disregarded, but in ascertaining the minimum flow it is very important to take the gauging at a selected and proper time. Indeed unless you have a series of gauges it is almost impossible to arrive at accuracy. This I have not done in the Colne. I have done so in the case of the Churn. Well, the minimum

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flow in the river Colne in 1864 I found to be 623 feet per minute.

7210. (*Chairman.*) What is its area?—80 square miles.

7211. That is about a quarter of a cubic foot per second from 1,000 acres?—Yes, it is the lowest gauging which I have ever obtained, and I was so surprised at that as compared with the 4,700 cubic feet per minute of March 1854 that I ordered the Stroud water river to be gauged at the same time, and I found that at Brimscombe it had fallen from 1,000 cubic feet per minute, the ordinary summer flow, to 640 cubic feet per minute. This showed that it was an exceedingly low time, the lowest time in fact that I have ever known. At the same time, I also took a gauging of the Boxwell spring which is the main although a late source of supply to the Churn, and I found 123 cubic feet per minute the minimum flow.

7212. Of course you could not tell what area that came from?—No, Boxwell spring is developed at the fault of which I have spoken.

7213. (*Mr. Harrison.*) In this case, besides the oolitic surface which receives the rainfall, there is a large area I take it of clays of different kinds?—Doubtless in the bottoms of the valleys, but the water which passes through the oolite when it encounters the fuller's earth, comes again to the surface in the shape of springs.

7214. From the clay surface you would not get any perennial supply?—No.

7215. Therefore, as source of perennial supply, the clay surface must be deducted from the oolitic?—Yes, but we do not get much of Oxford clay down to Lechlade. I have not separated the drainage area, but out of those 250 square miles there is very little clay.

7216. In taking your observations you have corroborated the evidence which was given by Mr. Simpson to the institution some time ago as to the loss of water in some of these tributaries to the Thames on their coming to the oolitic after passing over the fuller's earth?—Entirely, that is the case with the Churn. I gauged the Churn from Seven Springs down to North Cerney, and to that point you find progressive increase according to the usual law. When you get to North Cerney you find a sudden decrease.

7217. (*Chairman.*) The water gets absorbed and disappears by underground channels?—Yes, you can see a crack in the rock and away the water goes. At Rencombe Pond you find the same thing again and at Cirencester the river Churn, which above Rencombe was yielding about 370 cubic feet a minute, had got down to 46 cubic feet a minute. My notion is that the water which thus escapes comes out at South Cerney, and at the Boxwell spring I know that the notion is contrary to all geological views, because the stratum is above it, but the faults which we find account for all that, and if North Cerney is so much higher than South Cerney, it may well be that the water is recovered by this fault, and is developed at South Cerney. There is a strong practical argument in favour of that view, namely, that however much other springs vary these Boxwell springs are constant. Why? because the water is most easily lost at North Cerney in times of extreme drought.

7218. (*Mr. Harrison.*) This loss of water in the Churn is analogous to the loss of water in your canal?—Yes, only that it is a long way off and at a higher level. I will now give you the quantity of water passing into the Thames from the canal. I think you may take this to be 150 cubic feet a minute. Adding, then, 150 cubic feet from the canal to the 623 from the Colne, and 123 from Boxwell springs, one gets an aggregate of 900 cubic feet of water per minute. Ampney brook and Swill brook contribute together at least 100 cubic feet per minute more; so that in this way we may take the minimum flow of the Thames at Lechlade as 1,000 cubic feet a minute.

7219. That is 9,000,000 gallons a day of 24 hours?—Yes, I give you that as the very lowest possible quantity which ever can be in the Thames at Lechlade. I now come to the gauging of the Thames which I made myself on August the 6th 1864 at a time of extreme drought, though the river was not quite so low as it becomes in the autumn. I had great difficulty in taking the gauge, because the weirs and sluices were all out of repair, and I could not get a fair place. I went to two weirs, and at last I found the best place was at Buscot weir. I found the Thames was then yielding 3,240 cubic feet per minute.

7220. That is more than three times as much?—I do not attempt to reconcile the discrepancies. I give the gaugings to you just as they were taken. I conclude that it would be a safe calculation to take the minimum flow of the Thames at about 1,500 cubic feet per minute.

7221. (*Chairman.*) From this point?—Yes. Well, if there was no more than 1,500 cubic feet per minute, it would be enough to enable you to fill a lock full of water in three minutes.

7222. (*Mr. Harrison.*) Is that a lock of the size of yours upon the canal?—No, on the Thames I would take a lock at about 90 feet long and about 4 feet 6 deep, and 12 feet wide. No lock is much larger than that; at that rate you get each lock about 4,500 feet. Such a lock would be filled by the Thames in three minutes, hence it would be possible to let 20 boats pass in an hour, and, as far as water goes, you would really be able to accommodate as much coal as would be required for London or for the United Kingdom.

7223. (*Professor Way.*) You are dealing with the navigation alone, without reference to the mills?—The mills and the navigation are associated; the right of pounding and the right of mill are the same at this part of the Thames.

7224. The mills might be disregarded because they only use the water over and above a certain height?—Yes. I do not mean to say that 20 boats could pass in an hour because there would be the time for lockage, but so far as quantity of water goes, there is enough for the purpose.

7225. (*Chairman.*) Do you think that there are sites in any of the valleys above here where safe impounding reservoirs of any large area could be constructed for water supply?—I should say that it was not a suitable locality for that purpose, because they could only be constructed in the fuller's earth; we have no other bed of clay to deal with but the fuller's earth.

7226. (*Mr. Harrison.*) Up to what thickness is it?—It is about 40 feet, I think, but it varies; it tapers out. The fuller's earth is 70 feet thick at Stroud.

7227. And your experience upon the canal shows that it would never do to attempt anything of the kind near the great oolite?—Or the inferior oolite, which I think is rather worse. In the event of constructing reservoirs in the valleys where the fuller's earth is the bottom, you still would have a difficulty in the sides of the valleys.

7228. You get up to the oolite again there?—Just so. We have had a reservoir for supplying the summit level of the canal at Sapperton. I do not think that it was ever properly constructed, but it was not found at all a suitable thing, and it was consequently abandoned.

7229. To leave the question of the water supply, your canal, I think, was made at the latter end of the last century?—Yes, the date of the Act was 1783.

7230. And the canal was made at the expenditure of some 250,000*l.*?—Yes.

7231. Is there any other canal in connexion with it?—The North Wilts canal.

7232. Where does that canal go to?—It joins our canal at Latton and runs from Latton to Swindon; there it joins the Wilts and Berks canal, which runs thence to Abingdon. At Abingdon the canal joins the Thames which runs from Abingdon to Reading; and from Reading the Kennet and Avon canal leads to Bath.

7233. The traffic upon your canal has very considerably fallen off, has it not?—It has, not in gross

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tonnage, but in money receipts; the total amount which passes on the canal is pretty much about what it used to be, but then it is not through traffic; it does not pass over the whole extent of the canal; the principal part of it passes up the Stroud valley.

7234. It is not remunerative, and in consequence your company propose applying to Parliament in the next session for adapting the canal to the railway system?—Yes, the worst part of the canal, viz., the summit level, which it is very difficult to maintain, we propose to abandon, so far as that district is concerned, and to rely alone upon a railway. The lower levels of the canal, namely, between Stroud and Brimscombe, and from Cricklade to Lechlade, we propose to keep as a canal.

7235. You will then be in connection with the South Wales and Forest of Dean coal fields?—There is a railway which passed last year, crossing the River Severn at Newnham, called the Severn Junction Railway; that railway, by means of the Stonehouse and Nailsworth Railway, passes to Stroud; we propose to join that railway at Stroud and to run to the East Gloucestershire at Fairford, throwing out a branch to the Thames at Cricklade, which branch will also join the North Wilts at Latton.

7236. Then do you propose to bring coals by this canal when converted into a railway to Cricklade, and ship them upon your canal?—Formerly coals coals were carried by a tramway down to the river and put into a barge which worked its way to Brimscombe, and then they were put into a boat on the canal and came down to the Thames. Instead of that we shall pass coals direct from the Forest of Dean to the Thames at Cricklade. The effect will be to develop the coal, and give to the parties upon the Thames the opportunity of getting coal very much more easily than they now can. I wish particularly to draw the attention of the Commissioners to the point that the navigation of the Thames is a sort of practical check against railway monopoly. If you could only lower the rates upon the Thames coal would come down the whole length of the river in the easiest possible manner with the stream at no great expense, and there would be means of supplying coal at such a low rate all along the valley of the Thames that it would be difficult for railways to compete with the river. Therefore the public are interested in maintaining the navigation of the Thames throughout its ancient limits, that is to say, from Cricklade to London.

7237. When your canal is converted into a railway will not your interest become so much connected with the railway system that you will be induced, instead of shipping coal on to the Thames, to carry it by railway to different points towards Oxford and onwards?—Our interest in the railway system dies at Fairford, that is to say, on the East Gloucestershire Railway; our interest in the canal would extend from Cricklade to Lechlade.

7238. What distance is that?—9 or 10 miles.

7239. What is the distance from Stroud to Fairford?—About 24 miles.

7240. (*Professor Way.*) You keep the best part of your canal?—Yes, at both ends.

7241. (*Mr. Harrison.*) How is your canal at Cricklade supplied with water?—From the Churn.

7242. Have you abundant water to supply it?—Yes, we have no difficulty in keeping the east end of the canal supplied with water because of the low level. For the west end, viz., from Brismcombe to Stroud, we propose to preserve our present conduits of supply.

7243. (*Professor Way.*) In fact you will be more interested in maintaining the navigation of the upper Thames when that change has been made than you have been hitherto?—Quite so.

7244. (*Mr. Harrison.*) What are the present gradients of the Great Western Railway in ascending the Stroud valley?—The worst gradient is 1 in 60 followed by gradients of 1 in 75 and 1 in 76, as given in evidence by their own engineer, Mr. Fowler, last year; the worst gradient which we shall have on this railway will be 1 in 120.

7245. What are the gradients upon the East Gloucestershire line?—1 in 70.

7246. Then, when this canal is adapted to the railway system your new railway will have the best gradients between this part and the Forest of Dean and the South Wales coal fields?—Yes, I think that it will be the line for carrying coal and the true line for delivering that coal into the Thames at the upper part of the Thames. I am quite satisfied that there is no line through the Cotswold range which would get such good gradients as we have; indeed it is obvious the railway, being on the line of the canal, the canal engineers, when they had the pick of the country before railways were thought of, selected the best valley for forming the canal.

7247. (*Chairman.*) I think that that is shown by the principal lines of railway having to a great degree followed the old canal lines?—Quite so. In this case we obtain these gradients because we are 138 feet lower in the summit level than the Great Western line.

7248. (*Professor Way.*) It seems to come to this, that you think that the upper Thames ought to be kept up as a navigable river?—Undoubtedly.

7249. And you believe that with proper arrangement there is plenty of water for the purpose; those are the two great facts which you have brought out?—That is what I have been aiming at.

7250. Speaking generally, how would you deal with the river?—A great obstacle to all improvement on the river now is the double interest. You have the original weir owner and you pay him a fee for pounding, and you have the river commissioner who takes his toll for the locks. These two will not work harmoniously together; the river commissioner has no personal interest in the matter, and the weir owner at one place will not lower his dues but at another he will, and you cannot make a systematic toll. That is what I have found in trying to keep the traffic on the Thames.

7251. (*Chairman.*) Then you would say that what is wanted is to put the Thames into the best possible condition for navigation and to reduce the charge to the lowest fraction?—I would give one fair rate of due which would be the lowest that would be remunerative, so as to make the river a free river. There should be no profit at all resulting from these dues.

7252. (*Professor Way.*) I understand you to say that the object of keeping up the river at this upper part would be for the purpose of carrying coal, we will say principally from the west towards London?—Yes.

7253. I take it also that a very great part of the present traffic of the lower part of the river upwards towards Oxford consists of coal?—No doubt.

7254. Then the navigation of the upper part of the river if it was successful would be successful at the expense of the lower part?—It would be a question of competition.

7255. Supposing that it was now proposed, as the committee of the House of Commons has proposed, to put the whole river into the hands of the Conservancy, would not the Conservancy if they accepted it and made this provision for bringing coal to London be making an income at one end of the river and destroying it at the other?—If the Forest of Dean coal could be brought, say to Windsor, at a lower rate than sea-borne coal then I think that it is right that the Forest of Dean coal should reach Windsor.

7256. If you could prove that this would be the result would not the Conservators decline to have anything to do with the river, because they would say we should be taking from one hand and putting into the other at a double expense?—Then I should say that they ought not to have the river; the river must be taken as a whole.

7257. (*Chairman.*) Coals are not the only heavy goods which you would carry upon the river, you would carry corn and timber and so on?—Yes.

7258. (*Mr. Harrison.*) Is not the importance of the Thames shown by the sanction last year of the

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construction of a high-level bridge across the Severn, and the construction of the Thames and Severn Railway?—Yes, the coal traffic of South Wales is so enormous that almost any expenditure would be incurred to obtain it. It is possible that in a short time 11,000,000 of tons per annum of steam coal will be raised in South Wales. The coal there is the best steam coal which is obtainable. I speak of anthracitic coal.

7259. (*Chairman.*) Are you aware that for gas making purposes, and for other purposes parties consider that water-borne coal is delivered to them 1*s.* a ton better than railway-borne coal?—It might be in certain places, but it is not quite consistent with my experience; for instance, at Cirencester they tell me the reverse. All will depend upon the circumstances of the traffic.

7260. (*Mr. Harrison.*) At what point do you propose to ship coal from your railway to the river or canal, before or after you join the East Gloucestershire line?—We have the Cricklade branch on purpose for the coal traffic.

7261. What is the length of that branch?—About three miles.

7262. By this branch you bring into operation for conveyance of coal on this side of the Cotswolds, not only the Thames and the lower part of your canal, but also the canal going to Swindon?—Yes. The canal is kept open from this point (*pointing out the same*), so that vessels coming up here will pass by the river Thames. There is a canal and railway from that point.

7263. Is there any other point upon which you can give information to the Commissioners?—There is only one old Thames bargeman so far as I know in existence now; I tried to get him here to day, but did not succeed, he is an old man. I wrote down from his dictation a statement last year, and if you would like to have it I will hand it in to you.

The witness delivered in the same, which is as follows:

> "April 21st 1865.
>
> "Thomas Sisum has been a bargeman on the Thames from a boy for 50 years. In former years it was in so much better repair than at present, that he could carry larger freights than he could possibly do now. He has taken 68 tons from Brimscombe to Oxford scores of times and 80 tons from Abingdon to Marlow and Maidenhead in one vessel, being often in Brimscombe sized boats (*i.e.* boats, say 87 feet long by 12 feet beam). Since these boats were done away with in consequence of the shortening of the locks, he has worked barges drawing 3 feet 6 water and carrying 56 tons to Oxford from Brimscombe. At the present time if there were 3 feet 6 water throughout the canal he could not get along the Thames in many places between Inglesham and Oxford, unless there was flood water in the river. As regards the pound gates at St. John's Bridge, Buscot and Rushey he has passed the first two this week; they are in a very bad state, and the river is also, for want of ballasting. The horse bridges are in a dangerous state. He could not open the gates at the locks without a good horse and block, and those who have donkeys only have a hard matter to manage at all. They are obliged to draw the weir and lower the water 1 foot or 1 foot 6 inches before they can open the upper gates. The last time he took a boat to London was about 10 or 11 years ago, when he was paid 20*s.* per ton, the railway charge from Brimscombe station was 24*s.* per ton at that time. The 20*s.* he found was a sufficient remuneration to him, and if the river navigation was in good order he could work very well for 20*s.* from Brimscombe to London by way of the Wilts and Berks at Abingdon. He took a great number of barges loaded with stone to the Parliament Houses in 1842, from Dudbridge near Stroud and was paid about 22*s.* per ton, (either 21*s.* 6*d.* or 22*s.* 6*d.*, he forgets which.) The dues on the canal have been lowered since that time. The charges on the Thames were 2*d.* per ton at each pound lock besides the charge called the old lock charge to the weir owner. This varied at different places, it was high in the upper part of the river; for instance, at Buscot it amounted to 1*s.* for every five tons, and at other places it was merely a nominal charge. From Reading to Sandford the old locks run high. If there was but one fair charge as on the canals and the navigation was well kept up, he could take a deal of trade into the Thames."

The witness withdrew.

Adjourned to to-morrow at half-past 10 o'clock.

Lechlade, Thursday, 4th January 1866.

PRESENT:

JOHN THORNHILL HARRISON, ESQ., IN THE CHAIR.

Professor JOHN THOMAS WAY.

G. Milward, Esq.

4 Jan. 1866.

GEORGE MILWARD, Esq. (of Lechlade), examined.

7264. (*Chairman.*) You reside at Lechlade?—Yes, and have since 1839 been constantly resident. I am a Thames Commissioner.

7265. You are consequently well acquainted with the Thames and the locality?—Yes, the Thames runs through a part of my estate. Just above the town of Lechlade I have a meadow called Widney meadow, containing 36 acres, adjoining the river, the towing-path runs through it.

7266. Is that meadow subject to be flooded?—Yes, the river Thames is navigable to what is called the Round House in Lechlade, just where the Thames and Severn Canal joins the river by a cut. The Canal Company has also straightened the river there. The old river many years ago is reported to have gone down Mudlock ditch, but that is in the Buscot estate, which Mr. Campbell has purchased; he has a staff on my side, so that he has the fishery and the cleaning out of that place entirely. The channel is in a very bad state and requires thoroughly cleaning. I have communicated to Mr. Campbell the necessity for it, and he has partially done it.

7267. Have you observed whether the depth of the river has altered during the period you have known it?—I cannot say that, but there are flams washed up on one side of the river, and land on the other side undermined. This has altered the course of the river.

7268. Have the Thames Commissioners taken any steps to prevent the formation of those flams?—Not the least.

7269. Have the proprietors of the land adjoining taken any steps to encourage their formation?—No.

7270. Do you know that in some parts of the river they do so by planting osiers?—Yes, they do, lower down the river at Kelmscotte, opposite some other land that I have; a great piece has been taken in, the ditch where the water ran round has been filled up and planted with osiers in the last three years.

7271. Is that done to the detriment of your estate?—Partially.

7272. Had the river encroached upon your land?—Yes, and it works underneath now.

7273. Considering the Thames is placed under the control of a commission, should that state of things be allowed to exist?—Certainly not.

7274. Should it not be the duty of somebody to remove those flams as they begin to form?—It would be very desirable.

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7275. When a flam forms in the middle of the river is not half of it the property of the landowners on each side?—That is a vexed question I believe.

7276. If the centre of the river was at first your boundary, after the formation of the flam and the filling up of the narrow channel, where would your boundary be?—I have not inquired, but I should say the centre. In my Widney meadow there is now an accumulation in a flam that is planted with withies, and another person claims that because he rents the fishery of the place. I cannot prove that when my father bought the estate it was conveyed to him also.

7277. Under these circumstances there may be an accretion of land to your property which is claimed by another party?—Yes.

7278. Have you observed the effect of the embankments that have been formed in the river in the neighbourhood of Lechlade upon the land which is inclosed, and upon the adjoining land which is not inclosed?—I have.

7279. What is your opinion as to the effect? —I thought it was a very wild scheme at first, and think the result proves it to be so. I do not think it a benefit to the land.

7280. (*Professor Way.*) Do you think it unwise in principle or badly carried out?—Unwise in principle, the bank would not keep out the water that would come down in flood, and rise up upon the soil.

7281. But it has been stated that a large drain has been put on the inside of the embankment to carry off such water at a lower level, and that that has been found satisfactory?—Yes.

7282. Have you considered how the body should be constituted which has control over the river?—It should be a public body, the matters should not depend on private persons The farmers here until lately joined together in a sort of private arrangement to have the weeds in the river moved every year, and that certainly had the effect of sending the water off much more quickly, but the plan has fallen into disuse, because there are certain fisheries which require great supervision to see that the owners did not encroach above the flash mark when a flood came, and they were anxious to catch eels. We often find that the water is pushed out over the land from that cause.

7283. Are there any other points connected with the river upon which you can give us information?—You have heard, I presume, about the sewage of this town going into the river. It goes into the river at a place where old women often fill their tea-kettles, but they never complain of it; it passes into the river and goes down to London.

7284. Is there any system of sewerage in the town? —No, there used to be open drains, and they were stagnant, got green and beastly dirty. A rate was accordingly levied upon the parishioners; they deepened the sewer, and took the contents away with an outfall into the Thames, covered over. The sewer used to go up one side of the town, and still does so, but few of the houses have their drains connected with the sewer, and it is nothing like an effective arrangement.

7285. Are the contents of the sewer the washings from the houses, or the sewage?—The washings from the houses, and the washings from the road, and all that sort of thing.

7286. Does much sewage find its way out by that means?—No, drainage of houses generally in Lechlade is by dead wells which are emptied occasionally. In two farms of mine after a flood the overflow from the dead wells which are there to catch the manure finds its way into the sewer. Sometimes the water comes out very much discolored into the Thames from some places—pig-killing places.

7287. What is the subsoil?—Gravel.

7288. Does the sewage matter in these deep wells sink away?—The water percolates through the gravel, and every now and then we get out lots of black inky looking stuff, which is good for manure.

7289. Are you aware that the larger portion of the manurial properties of the sewage thus flows away into the gravel?—No doubt of it.

7290. Are there wells in the town from which the inhabitants obtain water?—Yes.

7291. Are they in any cases near to cesspools?—I have heard that they have been damaged by cesspools.

7292. Have you never known of cases of fever occurring in Lechlade? — We are particularly healthy and free from fever here, being on a gravelly soil, and our refuse going away to the river at Buscot where the soil is clay, they are subject to ague and fever. At Downing Town they had diphtheria and low fever, and that was thought to result from the drainage.

7293. Do you think it would be a proper thing to prevent the refuse of Lechlade being poured into the river as it is now?—I do not know what they are to do with it, if they do not send it into the river there is no other outlet at all. Lechlade is a very flat place, and the fall from my house to the river I think is not above six or seven feet, and hardly so much as that.

7294. What is the population of Lechlade?—By the last census 1,400. I think that under proper management the river might be very materially improved, but what is everybody's business is nobody's business.

7295. You stated, I think, that there is a towing-path alongside your meadow?—Yes, and the Thames Commissioners pay me a rate for it.

7296. Do you consider that there is a public right of way along it?—No, certainly not, only for the navigation; it is only a horse road.

7297. Are you aware that in one of the Thames Navigation Acts Parliament gave powers to the commissioners to make arrangements that the towing-path should become a public path?—I have heard so, but nothing of that sort is done here.

7298. While you have been in occupation of the piece of land near the Round House, has the river encroached upon the towing-path?—Yes, very materially; it is daily encroaching, and, in fact, the towing-path is hardly passable now.

7299. As the river encroached upon the towing-path, did the commissioners remove it further back into the land?—Yes, with my consent; they could not have done it without. They promised, if I consented, that they would cut a deep ditch, and would keep the path in constant repair, but that is long ago, and they will not do anything now.

The witness withdrew.

Rev. A. Neate.

The Rev. Arthur Neate (of Alvescote, near Lechlade) examined.

7300. (*Chairman.*) Are you the rector of Alvescote? —Yes; about 6 miles east of this place on the road to Bampton, three miles from the river, but there is meadow land belonging to Alvescote adjoining to the Thames.

7301. What is the extent of land belonging to the parish which borders upon the river, and is influenced by the flooding?—I cannot tell exactly. It is a strip nearly a mile long, between two brooks, and on an average 300 yards wide.

7302. Have steps been taken to embank any part of that land?—No; there is no bank on our side, the north side, there is on the other.

7303. Has the formation of the bank on the south side injured or benefited the land of your parishioners? —It has, perhaps, thrown the water a little more on our side.

7304. Is that an advantage or otherwise?—A disadvantage.

7305. How has the embankment affected the land on the opposite side?—It has secured it from flooding, and has done a great deal of good there.

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7306. Would a similar embankment in your parish be beneficial to the land?—Yes.

7307. Mr. Bryan Wood knows your locality, and has examined it?—Yes, he pointed out how the whole thing might be cured.

7308. He gave evidence yesterday before the Commissioners, and stated his view upon the subject, which was, that it was desirable to embank the river on both sides, and to make back drains to the landward on each side, so as to improve the land drainage, do you agree with that?—Yes, entirely, for so all our drainage might be taken into the great wide cutting which he has made to drain the Skilton and Aston meadows and our communication be stopped with the Thames, which does more harm than good.

7309. In the work that he has carried out below do you see an improvement?—Yes, a very decided one. There have been several partial drainages along the river in this county, and wherever they have been completed a corresponding benefit has been found.

7310. Are there any other points upon which you can give us information?—No other than that I have a very strong opinion it is high time to do something, or we shall have no river at all soon. For many years the river has been getting less and less, the tributary streams are not anything like what they used to be, I mean the Colne and the Leach and two more brooks down below, and I can certify, as a fact, that all the tributary streams from the north-west are very much diminished. Everybody that knows Little Farringdon brook from the Colne will know that it is not half the stream it used to be; it is the same also with Broughton brook and Alvescot brook.

7311. To what cause do you attribute the diminution of these streams?—I do not know. The rainfall is not sufficient to account for it, although there has not been an average rainfall for many years. Some people say that it is owing to the drainage, that the water does not ooze gradually out to fill these streams, and so they get very low. If that was true, they would be very high at one time when suddenly supplied with a downfall of rain, and empty at another; but I do not perceive that.

7312. (*Professor Way.*) Has much land drainage has taken place in this neighbourhood?—Skilton and all along here (*pointing to the map*) has been drained on the banks of the river, and that has relieved a great quantity of land lying farther from the river. Mr. Bryan Wood did that; he drained Aston Field and Aston Common, and he has really turned land that was worth only 2*s.* 6*d.* an acre into land worth now 30*s.* an acre.

7313. (*Chairman.*) He stated yesterday that in some cases the carrying out of land drainage instead of diminishing the supply to the Thames had actually produced a perennial supply?—It has put the Thames in communication with a larger area.

7314. A body of water which formerly evaporated from the surface is now collected by the drains and carried into the Thames as a perennial supply?—Yes.

7315. (*Professor Way.*) What is the nature of the soil at the spot you have referred to?—We are on the Oxford clay, on the north of the Thames; it is, as a rule, gravel on the top of the clay all the way from here to Oxford. On the south side is a good deal of clay.

7316. Is it possible that in carrying out the drainage, the pan, or stratum, which kept the water up was cut through, and that this may account for the diminution of the water in the streams?—The only tenacious stratum that we have is the Oxford clay, but the gravel is to be found at different depths.

7317. (*Chairman.*) Have you anything to state with regard to the pollution of the river?—Down at Radcot or at Harper's weir, we do not perceive that the stream is at all polluted, it seems in its natural state.

7318. You have observed for many years a gradual diminution of the water in the channel of the river?—Yes, I should think about 20 per cent. less in a year than formerly.

7319. Have you observed any increase in the quantity of the weeds in the river?—Yes, flams have grown up and rushes, and mud has been deposited in different places, and then these accumulations have caught more mud and grown.

7320. If the Government took steps to put the Thames into good order, would it not be reasonable to levy a rate upon riparian owners to maintain the works which had improved their property?—Yes. I think that the river ought to be utilized as a drainer and irrigator as well as a canal. The landowners, if they understood their own interests properly, will undertake something of the kind, even if no Government aid is afforded to them. All parties, including those interested in the navigation, should agree and each contribute rateably in proportion to his interest. I apprehend that the navigation works are, to a certain extent, similar to those which would be required for drainage and irrigation.

7321. In your opinion should any improvement be carried out systematically throughout the whole length of the river?—Yes, you must take the whole length of the river in order to execute any beneficial works.

The witness withdrew.

A. Powell, Esq.

ALFRED POWELL, Esq. (of Lechlade), examined.

7322. (*Chairman.*) Are you a resident in Lechlade?—Yes, and have been since 1839.

7323. You practised, I believe, formerly as a physician?—Yes, for 24 years during my residence.

7324. Are you acquainted with the mode of dealing with the sewage of Lechlade?—Yes. Generally speaking, I believe it is all carried, as Mr. Milward has described it, by deep-cut drains—formerly it was open I understand; those drains now convey away the ordinary washings of houses and slaughterhouses, and rain, and surface water—in fact everything but what would be most deleterious — namely, the contents of waterclosets and privies. We looked the town over when cholera was prevalent, and I believe that there is not one house, or scarcely one, that does not empty into a cesspool; the cesspools are empted periodically, and the contents carried out on the land, so that no detriment is done to the water. I have examined occasionally, in times of heavy rainfalls, the condition of the water, at one particular place near my house, and I have seen no more than a muddy state of the water—nothing dark or offensive coming down.

7325. Had you cholera in this town?—We had only one case, and that was within 50 yards of this house; it proved fatal in a few hours.

7326. Is there much fever in Lechlade?—In the first 10 or 12 or 15 years of my residence here we frequently had fever, but of late years we have had very little.

7327. Was there any local cause to which you could attribute it?—In some instances the very bad state of the drainage of the houses, in others it was very difficult to account for. A part of the town on the west, called Downing Town, which is low, and is much flooded at times, was always free from fever. I saw no case there during the first 21 years of my residence. In another part of the town called Little London, which lies high, and in this part which is also high, they had fever repeatedly, but I believe it has proceeded in a great measure from the filth in the drains of particular houses—fever has broken out in the same house more than once—in one house in particular it broke out three times, and we found out at last that it was owing to the dreadful state of a drain which ran under the house, but that was rectified, and there has been no fever since.

7328. Under whose direction was that done?—

Under mine. I told the landlady that it must be done, and in consequence of that she did it after a time.

7329. Did the Board of Guardians take any steps to get the nuisances removed?—Yes. In the year 1852, when the cholera made its appearance, the Board of Guardians of the Farringdon Union were very active, and they paid myself and some other gentlemen to make an inspection of the different parishes, and a great deal was done here and in the neighbouring villages. In this place all the people were very friendly about the matter, and whatever we wished to be done was done readily.

7330. Has that had a beneficial effect?—I think so; we have had very little fever indeed since.

7331. What conclusion did you come to as to what plan should be resorted to to utilize the sewage of cottages and houses in the town?—We did not dwell much upon that. We recommended the people to have the cesspools cleaned out soon enough, and to put the contents on to the land, which had been done, and which is done now. I had the same done with the waterclosets; I had the contents mixed with soil and put it on high land.

7332. The water I believe is supplied from wells? —From Little Farringdon chiefly, on the north, and springs that run through the gravel.

7333. How is the water brought from Little Farringdon?—By percolation only. We have a few springs I believe, and they all run in this direction from East Leach on the north-west and Little Farringdon on the north.

7334. Is the water affected by sewage in cesspits? —No; we have very good clear water, it is hard water, and a little turbid now from the rains, but not much so.

7335. Are you aware of a case that was mentioned by Mr. Milward at Inglesham?—Yes; that was purely a local thing; there was an old dead well, fed I believe from the drains of the house, and also from the water-closet. It was badly constructed and worn out, and consequently there was a percolation of deleterious matter into the well water, and in that way I believe the health of the inmates was undermined; they had a desperate outbreak of diphtheria all at once, almost every member of the family suffered, and three of the children died.

7336. Did that occur in a house that was not crowded?—Yes; it was not overcrowded.

7337. Did you consider that you could attribute the diphtheria directly to the pollution of the water? —I have no doubt of it; I had my suspicions at the time. The parties were about to move, until the house should be repaired. I recommended that they should make a thorough inspection of everything relating to the sewerage. This was accordingly done, and then the mischief was discovered fortunately. I had known the inmates of that house many years before, and they had never suffered from fever.

7338. From your knowledge of the country districts and the effect on health in cases such as you mention, how far do you think it desirable for the Government to interfere farther than they have done, so as to bring these nuisances in the cottages of the poor under control?—So far as I know of this place, and the neighbourhood, the present condition of the law I think meets all the requirements; we have nothing to complain of here. The inspector of police now is the person who is employed by the Board of Guardians as inspector of nuisances, and I know that there have been two or three cases in this parish brought to his notice, and they have been attended to. We find persons here extremely ready to do everything that is required, and we have no trouble in any case. Much has been done, there is not a great deal remaining to be done.

7339. Your experience is that the police are a useful body for the purpose of removing nuisances?—I think so; they have not done much, because we made such a thorough investigation into the parishes before. It is rather an invidious thing for a medical man to go and inspect and make reports, whereas the inspector of police is a public officer.

7340. Did you hear the evidence given by the Rev. Mr. Neate as to the diminution in the quantity of water coming down in the river?—Yes.

7341. Do you think there is any ground for his belief?—I do; it quite falls in with my own observation. I think that the floods are not so high as they were 20 years ago, although the waters collect and rise more rapidly.

7342. Does the same quantity of rainfall not produce as high a flood as formerly?—I do not say that; I only say the floods are not so high as they were, there is a diminution of the water.

7343. What is your opinion as to the perennial flow of the river in the summer season? — It was very low in the last unusually dry summer, and also in 1864, which had been preceded by a dry winter; on the whole the river seemed to be lower last summer, whether it is that I notice it more than I did I cannot say, but that is my impression The waters certainly rise more rapidly, and that fact I would ascribe to two causes: first, to the increase of obstructions in the river from growth of flams; second, to this, that there has been a good deal of land drained, and the ditches and brooks have had much more attention paid to them. I rented a little field of three acres adjoining the river just above the bridge from Mr. Nash. I commenced upon it in 1852, and I made hay in that field for 12 years, but, owing to the obstructed state of the river below, the large number of flams, the immense quantity of weeds, banks running into the river, and keeping up the water at the weirs, and the inattention of the people at those weirs, two acres out of the three were flooded by summer floods seven years out of the 12, so that my hay was either injured or destroyed. Had the river and weirs been in a proper state, I believe this would not have taken place for more than two years out of the seven. There is one flam just above the bridge that I have noticed all the time I have been here, and I am confident that that flam is by one half further into the river than it was 25 years ago, every year it increases, mud collects mud, and rushes, docks, and other aquatic plants keep growing, and in turn catch up mud, and if this goes on as it has done for the last 25 years, the flam will get far out into the river. There will indeed be no river at all, the bank will be forced right across into the coal wharf. If the river was well cleansed, and the weirs attended to, and the flash marks lowered (which could be done), I think great good would result, and the flooding here in Downing Town and other places would be very slight to what it is now. But just for the sake of fishing in the summer time they keep the water at the weirs three or four inches above flash mark, and that forces out the waters.

7344. (*Professor Way.*) You have spoken of the construction of the cesspools, and we understood Mr. Milward to say that they were carried down to the porous gravel, the liquid therefore would be filtered through the gravel and disappear?—Some must filter through. But generally the cottages have their privies detached in the rear, and I do not think there is much the matter in this respect, occasionally there may be. I have known two or three wells in this place spoiled by percolation from privies, it was the case in my own house.

7345. And there is no reason why it should not be more generally injurious to the wells?—The privies are put away in all the cottages as far as they can be got—at the end of the gardens—but probably there is more mischief done than we know of.

7346. I suppose although the solid matter is kept out of the river by these cesspools, a quantity of liquid excrement does find its way into the river through the gravel?—There is no doubt of that.

7347. Is not your drain watertight?—No, it is a walled drain, it is cleaned out occasionally. There is very dirty stuff in it, and when there is a great head of water it is washed out, and goes into the river.

The witness withdrew.

LECHLADE.

Mr. J. Nash.

4 Jan. 1866.

Mr. John Nash (of Inglesham) examined.

7348. (*Chairman.*) Where do you reside?—I am a farmer at Inglesham.

7349. How many years have you resided there?—More than 30 years.

7350. How many acres do you farm?—About 140.

7351. Is any part of your land near the Thames?—Yes, about three acres; we have, I think, 160 acres in the parish of Inglesham that the water goes over.

7352. Have any steps been taken to embank it from the river?—No, not more than Mr. Campbell has done, he has done some embankment in the parish.

7353. Do you think he has done it beneficially to his land?—I should think not. I see that a great deal of it is washed about and washed down.

7354. It is not very encouraging therefore to embank the remainder of the parish?—I should think not.

7355. Should you expect that an embankment of that kind would be beneficial if it were not attended to?—No.

7356. Mr. Campbell's embankment has failed to keep the river off the land, because it got trodden down in part; and if the water once gets in it is prevented from getting out again?—Yes.

7357. So that the embankment is mischievous instead of beneficial?—I think so.

7358. (*Professor Way.*) How long is it since Mr. Campbell made that embankment?—Two years ago.

7359. How long did it remain tolerably perfect?—For some little time, more than six months.

7360. (*Chairman.*) Have you observed the quantity of water that comes down the river at different times?—Yes.

7361. Do you think that the quantity of water in the summer time is as much as it used to be?—There has not been much difference, it comes down more hastily from off the hills, from the ditches and brooks being cleansed out more.

7362. After it has passed off in the summer time is there as much comes down as in former years?—There is not much difference, in the last two years we have had no water hardly in the river, but those have been extraordinary summers.

The witness withdrew.

J. Cornwall, Esq.

James Cornwall, Esq. (of Fairford), examined.

7363. (*Chairman.*) Where do you reside?—At Fairford.

7364. How many years have you resided there?—All my lifetime; I have practised there for 23 years.

7365. How many years have you been medical officer to the Cirencester Union?—I have been medical officer for that district 15 years, but my father had one portion of the district, and I attended with him before that.

7366. Does that union border on the Thames for any considerable distance?—Yes, a long distance, but the only part that I know is from where the parish of Marston Maisey joins Down-Ampney and Eisey down to the parish of Kempsford.

7367. Is that part of the river subject to floods?—Yes.

7368. Are there any obstructions to the free flow of the river?—At certain places there are the remains of old flams—those are about the only great obstructions.

7369. Have you observed any great effect produced upon the health of the inhabitants of the Thames valley in consequence of flooding?—Not so much lately as in former years. In Kempsford there was formerly a great deal of ague, but now I scarcely ever see a case of ague. That has arisen of course from the improved drainage of the parish itself. Before the inclosure of the parish there was positively no outlet for the water at all. In another parish, where the level of the water is now a considerable number of feet below the soil, my patients have told me that they have had in the winter months to reside in their bedrooms for upwards of a fortnight together in consequence of the water flooding the lower rooms of the house.

7370. What is the population of Kempsford?—Nearly 1,000.

7371. How long is it since the ague began to diminish?—I have scarcely seen any ague for the last 20 years.

7372. Has the land drainage of the parish been carried out within the last 20 years?—A great portion was before that.

7373. Have you observed any other kind of sickness in the parish of Kempsford?—Yes, periodically very severe attacks of a low kind of fever, which I would attribute in a great measure to the very imperfect state of the drainage and the bad condition of many of the cottages; in other cases to the total want of cesspools. The cesspools really are in a most disgraceful condition. Throughout the whole of Kempsford village there is no one outfall of drainage worth calling by the name.

7374. What steps have been taken by the guardians to remove the nuisances?—Some years ago the medical officers received instructions to look into the matter and I believe they did so. I went through every parish in my district most carefully, making notes of the condition of every place that I found in an improper condition. The guardians behaved in the most liberal manner to us, but whether a man is a medical officer or not he can always make complaints to the board of guardians. Some inspection of this kind is necessary. No house should be allowed to be built without having a proper cesspool and proper drainage from it. If you allow house after house to be built with bad drainage, to make the parish ultimately an healthy one must cost an enormous amount of money, and a parish dreads once to begin a course of expense.

7375. (*Professor Way.*) As medical officer of the union, have you found that fever breaks out in certain localities and in certain houses from time to time with almost certainty?—I cannot go quite so far as to specify the houses, but there is no question at all about the fact.

7376. Does the sickness which arises in these localities add to the charges of the poor rate of the union?—It does, and very heavily according to my experience.

7377. Therefore it is important to the ratepayers, not only of the parish, but of the whole union, that steps should be taken to remove the causes that give rise to fever?—It is most urgently required.

7378. Is it your opinion that the inspectors of police throughout the unions would prove useful inspectors of nuisances?—I do not think they would—their other duties would take up too much of their time; and besides, it would bring them into collision with almost every person in the parish.

7379. Is it desirable that an inspector of nuisances should be appointed in each union?—I consider it of the greatest consequence in each district, both for the individual benefit of the ratepayers and for the benefit of the poor. The condition of the cottages in Kempsford parish, although improved, is disgraceful. I do not retract a word that I have said as to the condition of the cottages in that parish; they are digraceful.

7380. You are no doubt aware that in large towns the houses are built under the control of the authorities and in accordance with certain rules?—Yes, I am quite aware of that.

7381. Could a somewhat similar system be carried out in the country districts?—No, I do not think you could carry out a system so strict as that without an enormous outlay of money; but an improvement of the present condition of the cesspools and drainage might be carried out to a very great extent.

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7382. When it was found from the state of the privies and drains that sickness prevailed in a certain district, might not steps be taken to provide a remedy by having the houses built upon a better plan?—Yes.

7383. So that such ill-built and ill-contrived places should not be used as the habitations of man?—Yes, I think that that is quite feasible. Perhaps I might refer to a case in Kempsford parish. In one place there are two houses called cottages, which are built in an old saw-pit. There is not the slightest drainage, and every particle of filth is emptied right in front of the doors on what is called a muck-heap. There is no such thing as a privy to either of the cottages. I have had cases of fever, not there, but just on the opposite side of the road, where the cottages are quite as bad, over and over again, and to a very severe extent.

7384. Have you ever known malaria to arise from flooding of lands in the valley?—No, not of late years.

7385. Nor of sickness arising from flooding?—No.

7386. You probably heard what Mr. Powell stated as to the quantity of water passing down the Thames now as compared with what passed formerly?—Yes, and I think there is no question that the quantity of water during the summer months is decidedly less than it was some years ago, but I think it is easily accounted for by the improved system of drainage, and especially deep draining; that surface water goes into these deep drains, is carried out rapidly into the ditches, and from them down into the small streams, and thence into the Thames; that floods rise much more quickly and then subside more quickly; so many springs are tapped in making these drains that after the floods subside, you do not get the spring water as you did, percolating and constantly running, and consequently you have not the same quantity of water in the bed of the river. The water coming down the Thames is not sufficient to keep the channel and banks clear of obstructions.

The witness withdrew.

Mr. Albert Edmonds (of Longworth) examined.

Mr. A. Edmonds.

7387. (*Chairman.*) Have you heard the evidence that has been given?—Yes.

7388. Are you able to confirm it generally?—Yes.

The witness withdrew.

Daniel Bennett, Esq. (of Farringdon House), examined.

D. Bennett, Esq.

7389. (*Chairman*). What extent of land do you own that is subject to be flooded?—I own a strip of land about a mile and a quarter in length, on the river bank, and half a mile broad, which was liable to flooding. Since it was embanked we have very little flooding.

7390. Was the land below your property embanked some time ago?—Yes, by the Inclosure Commissioners; it belongs to Oriel College.

7391. What was the effect produced upon your land?—Whenever there was a flood the embankment below forced the water back upon my land, and I had twice as much water as before. I was obliged to embank my land as far as it went by the side of the river.

7392. Has that embanking proved beneficial to your land?—Yes, immensely beneficial in summer. In winter, with a flood like this, I believe the tenant puts in a hatch and lets very high water over his land to flood it.

7393. Have you good drainage on the landward side away from the river?—Yes, everything is drained very nearly.

7394. How is the land above yours affected by your works; in a similar way to what yours was by the embankment below you?—I do not think so much, because the land rises; the bank there is naturally higher.

7395. Your experience leads apparently to this—that any embanking of the river should be carried out systematically throughout the whole length?—Yes, with power to the tenants on either side in the time of very high floods to have hatches, so as to be able to let the water on to the land for purposes of irrigation.

7396. If the management of the river Thames were put into the hands of a body, whose duty it should be to improve the river by embanking it, and to give facilities for irrigation, would it be a fair and equitable thing to lay a rate on the landowners whose land would be benefited?—The landowners would not at all approve of that, but I think they ought to do it for themselves.

7397. There are difficulties in the way of that, among other things it would be the duty of any commissioners to carry out a system of back drainage; this, under present circumstances, is not very easy to do; you could not carry a drain through your neighbour's land?—It is a question whether the land would be improved.

7398. (*Professor Way.*) Suppose it was proved that the land was improved by embankment and drainage; you would not, I presume, object to contribute your fair share of any rate that might be levied for that purpose?—I have done for myself all I want.

7399. Have you observed the river for years past?—Yes, and I think the river gradually gets shallower altogether. There are no towing-paths or bridges kept in repair now.

The witness withdrew.

Adjourned till Friday, January 5th, 1866.

Great Marlow, Friday, 5th January 1866.

Present:

JOHN THORNHILL HARRISON, Esq., in the Chair.
Professor John Thomas Way.

Thomas Rolls, Esq. (of Great Marlow), examined.

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7400. (*Chairman.*) Are you a resident in Great Marlow?—I am. I reside on the immediate banks of the river in the parish and borough of Great Marlow, and I have resided here for 85 years.

7401. You can therefore remember the Thames navigation for a great number of years?—Yes. I was a good deal connected with it in its days of prosperity. I was one of the Commissioners of the Thames, although I very seldom attended their meetings.

7402. Have you ever been on the committee?—Never. I always shrunk from that, for I never quite liked the constitution of it, and I felt that I could be of no service.

7403. In the early period of your recollection was

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there much traffic up the Thames past Marlow?—Yes, to a very great extent.

7404. Was that increased by the improvements that were made in the navigation?—Certainly. The navigation and commerce on the Thames kept on extending and increasing until railways were introduced; then railways diverted the traffic by the superior and greater accommodation which they afforded to the public.

7405. Has the introduction of the railway system affected the traffic upon the Thames to Great Marlow?—Extremely so.

7406. What is the distance from Marlow to the nearest railway station?—About three miles and a half.

7407. Is there now much traffic upon the Thames to Great Marlow?—Very little.

7408. Do you attribute the falling off of the traffic almost entirely to the introduction of the railway system?—Certainly I do.

7409. And not to the dilapidation of the locks and other parts of the Thames?—Certainly not from the imperfect repair or the imperfect construction of the locks; that has certainly had some very slight effect, but the real cause of all has been the superiority of the railway in affording greater and cheaper accommodation in transferring goods from one place to another. I do not believe that any canal or river navigation can at all compete with railways.

7410. In what respect were the locks defective?—The sills were not low enough, that was the chief cause.

7411. Was that generally the case?—I should say so.

7412. What was the consequence of that?—The navigation was to a certain extent not so perfect as it might have been.

7413. And uncertain, I suppose?—There was a degree of uncertainty about it, but in the latter part of the time of the Thames traffic there was much more certainty; the traffic was conducted better, and accommodation was better.

7414. If the locks were improved so that there should be a sufficient quantity of water upon the lower sills, and the river was otherwise improved by ballasting, so that there was no impediment, and the navigation was certain, do you think that the trade of this neighbourhood might be revived?—Certainly not. I give a very decided opinion upon that.

7415. Then what would you recommend to be done with the Thames under these circumstances?—I do not know what can be done with it; it is very difficult to find a remedy.

7416. Are there many shoals in the river that impede the navigation?—There are some certainly.

7417. Have they increased of late years?—Yes.

7418. I observed below Great Marlow that there are many eyotts and small islands in the river?—Yes; but they are no impediment to the navigation.

7419. Do those eyotts increase?—I do not think they do.

7420. They have remained nearly the same as they are now since you can remember?—They have been always so during the whole of my life.

7421. Is there much boat traffic upon the Thames?—Yes, that has wonderfully increased.

7422. Is the present condition of the locks and the bed of the river itself an obstruction to that pleasure-traffic?—The locks certainly injure it to some degree, but I do not think there are any shoals in the river to prevent boating or anything of that sort.

7423. (*Professor Way.*) Do you notice any difference in the character of the water itself?—I have noticed very little difference.

7424. Is the river here at any time in an offensive condition?—Not in the slightest degree. I live within 10 yards of it, and the water slightly filtered is used for domestic purposes.

7425. How is your house supplied with water?—From a well within about 10 yards of the Thames.

7426. Is the water filtered in your house?—No; by the natural percolation through the earth.

7427. The Thames water filters into the well?—Yes; the ebbing and flowing of the Thames affect the well. The water in the well is always pretty nearly at the same level as the water in the river.

7428. You do not think that the water of the Thames is affected any more now than it was many years ago?—That is quite my opinion. I think the Thames is much maligned and villified; they say the river is offensive and is loaded with all sorts of impurities, but I deny that to be the fact.

7429. At all events, you have never seen impurities?—No, I have never found it out. Last summer two friends of mine started from Oxford to go down the river in a boat in order to test whether the river was in the impure state that it had been represented to be. The first night they slept at Pangbourne: there the water used for domestic purposes was pumped slightly filtered from the Thames; the table linen and the sheets were washed in the same water, and nothing was found to be offensive in the slightest degree. The next day they passed the town of Reading, and there came in conjunction with the Kennet; they observed the Kennet side of the river to be discolored and perhaps rendered impure by the sewage of Reading. But I may tell you that for 70 years I remember the water being discolored very much as it is now. My friends then continued their journey down to Sonning, and there they got out and tested the water; they used it for their tea and other purposes, but there was no impurity found—nothing offensive. They then continued their journey down to Marlow, and here again they used without inconvenience water pumped from the Thames and slightly filtered. At Eton, again, they found nothing offensive in the water. Then they went to Ouseley; there, too, there was nothing offensive that they could detect. When they arrived at Hampton, there they saw the machinery that pumps up the water for the supply of London, and there they found nothing at all offensive. The Thames is said to be loaded with impurities of every kind, and sewage no doubt is carried into the Thames; but I will take leave to say that nature has given to all running water the faculty of purifying itself; one means is the aquatic weeds submerged under the water.

7430. (*Chairman.*) Have you observed whether the weeds have increased of late years?—Certainly, they have greatly increased.

7431. What mills are situated upon the Thames above Great Marlow?—There were till lately extensive paper mills.

7432. Are they not so now?—No, they are not employed for any purpose. They are the property of Colonel Williams, the member for this borough.

7433. When those mills were at work were they at all offensive?—No; perhaps immediately upon the mill-tail there was something offensive, but before the refuse was gone 200 yards it got mixed up with the general current of the Thames.

7434. Are the mills below Great Marlow paper mills?—Yes, and at Great Marlow now.

7435. Is any offensive matter thrown into the Thames from them?—Nothing of the slightest consequence that I am aware of.

7436. Has any system of sewerage been carried out in Great Marlow?—There is a short sewer that runs into the Thames chiefly from a brewery that we have here, but I can never detect that the Thames is deteriorated by it; that the water is more impure. If you watch the water where it empties itself into the river, you will find an abundance of small fry and fish there, and the Thames never was more bountifully supplied with fish than now.

7437. (*Professor Way.*) Are cesspools generally used here?—There are many cesspools in the town of Marlow.

7438. (*Chairman.*) In what formation are they dug?—The subsoil is gravel, but a little below that is chalk.

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7439. (*Professor Way.*) How thick is the gravel ?—Perhaps three feet.

7440. (*Chairman.*) Are the cesspools emptied systematically ?—No.

7441. Have you any local board of health ?—Yes.

7442. From what source does the town obtain its water supply ?—From the natural percolation of the hills.

7443. It is pumped out of the chalk ?—Yes.

7444. (*Professor Way.*) There is no system of water supply by pumps in the town ?—None whatever.

7445. (*Chairman.*) You say that there is no nuisance from the brewery ?—The refuse used to be carried away in carts, which was a most offensive practice; but since the covered drain has been made the refuse now empties itself into the Thames, and we know nothing about it.

7446. What was discharged into those cesspools, the drainings of the casks ?—All the impurities of the brewery.

7447. Do you think that it is a desirable thing that the refuse from the brewery should be carried into the Thames ?—I think it is the best way of getting rid of it by far. I cannot find that the Thames is injured.

7448. (*Professor Way.*) If you lived in London, and you were dependent for your water supply upon companies which pumped the water up from above Kingston, do you think you would take the same view of the matter?—I do not assume what I do not know.

7449. (*Chairman.*) Is there any land in the neighbourhood of the Thames that is subject to floods ?—At this moment the low lands are flooded.

7450. Are the floods injurious to the land ?—No; they are inconvenient certainly, but we have always been subject to the inconvenience of floods.

7451. Have you observed whether these floods come down to Great Marlow more rapidly than they used to do in your younger days ?—I do not think they do.

7452. Do they rise to a greater or less height ?—To a much less height than they did 40 years ago.

The witness withdrew.

Mr. JOSEPH WRIGHT (of Marlow) examined.

Mr. J. Wright.

7453. (*Chairman.*) You occupy Marlow mills ?—Yes, conjointly with my brother William Wright.

7454. How are those mills employed ?—In the manufacture of paper.

7455. Of what description ?—Wrapping papers, small hand papers.

7456. You do not carry on bleaching to any great extent ?—Very slightly.

7457. From what material do you make paper ?—From bagging and roping.

7458. What chemicals do you use ?—In the first process lime; not the caustic alkali at all, but simply lime boiled for a lye; after that we use chloride of lime for bleaching, but that is neutralized by the antichloric.

7459. What quantity of materials do you use per week ?—Rather more than five tons a week.

7460. To manufacture what quantity of paper ?—Between three and four tons per week on the average.

7461. What quantity of lime do you use per week ?—From 18 to 20 bushels.

7462. What rate per bushel ?—Something less than half a hundredweight.

7463. What quantity of chloride of lime do you use ?—About 5 cwt. per week.

7464. What becomes of the refuse from the chloride of lime ?—We wash it down into the river, but there can be no injury from that I am sure.

7465. Do you use the lime in a state of lime water ?—Yes.

7466. What do you do with the residuum that falls to the bottom ?—We use part of it again, but it finally runs into the river.

7467. The whole of it ?—Yes.

7468. Would there be any difficulty in keeping it out of the river, and taking it upon the land ?—The only difficulty would be the expense.

7469. Is it of any use for agricultural purposes ?—Scarcely, the quantity we use.

7470. Is there not a pound lock immediately adjoining your mill upon the navigation ?—Yes.

7471. Is there any old lock ?—Yes; I am joint proprietor of that.

7472. Do you receive tolls from it ?—Yes.

7473. What state is the lock in ?—In a very fair state now.

7474. Is it of easy access for barges from below ?—Yes.

7475. Is there plenty of depth on the sill ?—Yes; giving a little lower depth would perhaps be an improvement upon ballasting on the flats.

7476. How many years have you occupied the mill ?—Fifty years.

7477. Has the traffic upon the river in that time very much diminished ?—Yes, since the railways came into operation.

7478. Is that diminution attributable almost entirely to the railways ?—Yes.

7479. Not to the condition of the river ?—No; the river has got into its present condition on account of the revenue from the traffic not being sufficient to meet the expense.

7480. If the river was improved, and the navigation put into proper order, do you think that the traffic which has been lost would be in any degree restored ?—If you could have traffic carried at charges less than the railway charges, and certainty could be secured in the transit of the barges, no doubt many descriptions of goods would go much better by water.

7481. Do you receive your coals by the river ?—Yes, we use the river for coals.

7482. What quantity of coals do you use in a year ?—About 30 tons per month.

7483. How do you obtain them ?—From Somersetshire, by small boats; they come down by the river Kennet to Reading and thence to Marlow.

7484. Is there much traffic in coals by that route now upon the Thames ?—Not a great deal this way.

7485. Is the river now in flood ?—Not in flood; the water is high.

7486. How does that affect your mill ?—It goes very heavily; we have lost the fall and the power.

7487. What power have you when the river is in the best condition ?—About 5 feet.

7488. Do you use all the water in the river ?—Yes, with the exception of the water taken by the flour mill.

7489. Is that yours ?—No.

7490. There are two mills on the river ?—Yes; a flour mill, and our mill.

7491. How is the supply of water to the two mills regulated ?—By our gates; we regulate it on to the wheels.

7492. Each mill draws the water ?—Yes.

7493. Is there abundance of water for both mills ?—Yes, except in very short-water time.

7494. Do you keep the weir in repair ?—Yes.

7495. Can you give us any information as to the cost of the repairs ?—It is expensive work to keep up a long range of fall like ours. Our average cannot be less than 100*l.* a year.

7496. What may the tolls be worth to you as lock owner ?—They used to be worth 150*l.* a year; but they are now not worth more than 30*l.*

7497. If the weir was kept in repair by the commissioners would you consider that as an equivalent for your lock dues ?—If we could come to an understanding as to the use of the water, otherwise the mills might be swept away or blown up.

7498. Would it be advisable to have a fixed over-fall weir for the passage of the water ?—It is now so; we have lock-gates and backs which draw out. Sometimes persons have complained that we have not drawn out

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our lock and our backs. That is not the evil; the evil is that the channel of the Thames contracts close by the wood and the water cannot get away. When the water rises 1 inch in the channel elsewhere it will rise 4 inches behind this point of contraction, and so sometimes cannot get away without overflowing its banks.

7499. Is the contraction of the channel a natural obstruction ?—Yes.

7500. Whereabout is that ?— Just down by the wood, between Marlow and Cookham.

7501. Does that affect your tail water ?—Yes, to some extent, but only when the water is high ; the water goes off fast enough in ordinary times.

7502. What is the length of the pond between you and the mill above ?—Not a mile.

7503. You cannot store any large quantity of water ?—No.

7504. Are there mills above where that can be done ?—Yes ; but not a very large quantity.

7505. Are the means of passing the water at flood times regulated by the commissioners ?—There are byelaws regulating that; the water when it reaches a certain height is to be let out.

7506. May there not be at one mill or weir greater convenience for passing flood water than at another ?—There may be, but if you could throw the whole weir flat down the water would still be unable to escape if the channel below remained too narrow. Thee is one other point to mention, which is this: the pen-gate at Cookham used to be 18 inches, that has recently been made 3 feet, and the consequence is that it throws the water back upon us, and render no benefit to the navigation. The better plan would have been to ballast the flats ; there is a flat near us, Gossmore, another down in the Gulls, and another at Wildman's Bridge, if these were ballasted that pendown would be unnecessary. I may repeat my belief that if the carriage of goods by the river could be brought down as low as the charges by railway the traffic by water would increase.

7507. I presume that as well as lowering the tariff it would also be important to put the navigation in such a state that transit should be certain ?—Of course.

7508. One chief means would be to have the shoals removed ?—Yes.

7509. And the lower sills of the locks lowered ?—Yes.

7510. Is the system of flashes carried on in this neighbourhood ?—Sometimes ; but they ought not to be, for they do great mischief.

7511. With a good system of navigation you think they should be done away with ?—Yes. I think that the boats should be brought to the condition of the Thames, and not the Thames to the condition of the boats. The old west country barges used to lie off Marlow, 40 or 50 of them at a time, and these flashes had the effect of draining the river for a day or two sometimes, and then the boats were caught. If the boats were made to draw less water I think it would be better than having large boats ; but then they say small boats will not pay.

7512. Would not deepening the shallows below and lowering the sills of the locks enable larger boats to be navigated ?—No doubt.

7513. That would also improve your tail-water, would it not ?—It would.

7514. And do away with the necessity forany system of flashing ?—Yes.

7515. The quantity of water used for the navigation would be diminished if the flashes were done away with ?—Yes, the water would be husbanded more.

7516. And there would be more water for the use of the millers ?—I do not know that ; but it would be more regular.

The witness withdrew.

Mr. H. Stallwood.

Mr. HENRY STALLWOOD (of Great Marlow) examined.

7517. (*Chairman.*) You are resident in the parish of Great Marlow ?—Yes.

7518. You were, I believe, lately surveyor of the parish ?—I have not been surveyor for 20 years. I have been sanitary inspector up to the last year.

7519. Under the Board of Health ?—Under the Common Nuisances Removal Act. We have no board of health. I was inspector under a committee chosen at the vestry of the parish, not under the guardians.

7520. What becomes of the sewage from the houses in Great Marlow ?—There are common cesspools in the town.

7521. Is that the general practice ?—Yes.

7522. Are those frequently emptied ?—Yes ; the small ones, which form the majority, are.

7523. As inspector of nuisances, was it your duty to see that they were systematically and regularly cleaned ?—When they became offensive and full, it was my duty to complain of them, and to get them emptied.

7524. There has been no regular system of sewerage carried out ?—None at all.

7525. The water, as we are informed, is generally drawn from wells sunk into the chalk ?—Not generally. Most of the wells are gravel or sand at bottom ; they are not sunk down to the chalk, as water is found without going so deep.

7526. Have you known any instances in which filtration from cesspools has injured that water supply ?—Yes, there is one case in St. Peter's Court ; the water has been impregnated, and is still bad.

7527. Was that injurious to health ?—No question about it. The water had been analysed at different times, and appeared to be bad.

7528. Has there been any fever in St. Peter's Court ?—At the time when the cholera was very bad in Great Marlow, that court was one of the principal places affected.

7529. Has St. Peter's Court been brought under the consideration of the local authorities ?—Under the consideration of the committee repeatedly.

7530. What steps have they taken to remove the nuisance ?—Accommodation with regard to privies was increased, and a new cesspool was made in that court.

7531. How long ago was that ?—I should think six or seven years ago.

7532. What has been the effect ?—The arrangement is much better, but still not by any means perfect.

7533. Does fever still occur there occasionally ?—Yes, low fever.

7534. Has that been brought under the notice of the authorities ?—Yes, repeatedly.

7535. Up to this time has no effectual remedy been applied ?—None at all.

7536. We have been told that a drain has been carried from the brewery in the town ; is that of any extent ?—Yes. The drain empties itself just by the side of the bridge at the side of the churchyard.

7537. A good portion of the town extends below the point of discharge ?—Some part.

7538. Have you observed in summer time, when the water is low, any deposit on the bank of the Thames ?—No. The sewer runs now a good distance into the Thames, and when it gets there the refuse is well diluted.

7539. Have you heard complaints made of the discharge of that refuse from the brewery into the Thames ?—I have heard complaints of the smell arising from the sewer at the end of the town before it gets to the Thames, but not afterwards.

7540. Are there any gasworks in Marlow ?—Yes.

7541. What becomes of the refuse from them ?—(*Mr. Rolls.*) I am chairman of the gas company, and

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am able to say that from its establishment until last year there has been no refuse cast from the works into the Thames; it is all taken away.

7542. (*Professor Way to the witness.*) Can you give us any further information as to the formation of cesspools in the town?—They vary; some are small, some larger. They are made in the gravel.

7543. Have they overflows which pass into the river?—No; the only overflows are on the premises of those to whom they belong.

The witness withdrew.

Mr. J. Neighbour.

Mr. JAMES NEIGHBOUR (of Great Marlow) examined.

7544. (*Chairman.*) You are, I believe, at present inspector of nuisances?—Yes.

7545. How long have you held that office?—Since last March.

7546. What are the principal nuisances which you have found to exist?—We have had cases of over-crowding, and houses wanting ventilation, white-washing, and so on, and cesspools overflowing.

7547. Has this had a bad effect upon the health of the inhabitants?—No doubt.

7548. Have you brought these nuisances under the consideration of your board?—Yes.

7549. What steps have been taken to remove them?—Orders have been issued, and have been attended to.

7550. With beneficial results?—Yes.

7551. You are aware, no doubt, of the drain from the brewery?—Yes.

7552. Is there much pollution of the water in consequence of that?—A good deal runs into the river from it.

7553. What house drains pass into it?—I do not know.

The witness withdrew.

Mr. C. Carter

Mr. CHARLES CARTER (of Great Marlow) examined.

7554. (*Chairman.*) You are the county surveyor?—Yes.

7555. How long have you held that appointment? About 18 months.

7556. (*Professor Way.*) This particular drain from the brewery is not likely to convey the sewage of a large number of persons into the river?—No.

7557. The chief thing that is carried away by it is refuse from the brewery?—Yes; the washings of the casks.

7558. (*Chairman.*) Is there any tributary which flows through the county of Buckinghamshire into the Thames?—There is the Wye which goes into the Thames at Bownend, about four miles from Marlow.

(*Mr. Rolls.*) At a point called Wildman's Bridge.

7559. (*To the witness.*) Is any sewage passed down the river Wye into the Thames?—Yes. I believe the sewage of Wycombe runs into it.

7560. Without any steps being taken to deodorize it?—I believe so. I have not heard of any alteration.

7561. The Wye is a chalk stream?—I should say so.

7562. (*Professor Way.*) Has Wycombe been thoroughly sewered?—There is a sewer that runs down the main street.

7563. No modern system of sewerage has been adopted?—No, only the sewer has been lengthened.

The witness withdrew.

Mr. J. Hayne.

Mr. JAMES HAYNE (of Great Marlow) examined.

7564. (*Chairman.*) What is your occupation?—I am a boat builder.

7565. How long have you lived here?—All my life; I was born here.

7566. Who is the senior bridge warden of Marlow?—(*Mr. Rolls.*) I am, and an ex-officio Thames Commissioner.

7567. (*To the witness.*) Have you observed much difference as to the formation of shoals in the navigation?—The thing has gone to decay for the want of tolls, and gravel hills have grown up in different parts where they used to ballast a great deal; there has been a want of funds.

7568. Have these obstructions grown up to such an extent as to impede the navigation?—Not a great deal; the boats are smaller than they were formerly, and therefore they do not feel it so much.

7569. You live close to the bridge?—Yes.

7570. How far are you from the brewery outfall?—About 30 yards.

7571. Do you find that outfall a nuisance at any time?—Not at all.

7572. Is it carried some distance into the river?—The arch does not go any further than the bank of the river.

7573. Have you observed at any time during the summer season the banks below of the river to be offensive?—Not at all; what flows in there is neutralized by the water directly, and I believe does not affect the river much. There is occasionally a little smell when there is very hard weather, and when half of the arch is out of the water, then there is a stench at very low water.

7574. Have you traded at all upon the river as a barge owner?—No, I let boats.

7575. Do you find that pleasure boating on this part of the Thames is increasing?—Yes.

7576. To any considerable extent?—Yes.

7577. Do you think that it would increase faster if better accommodation were afforded for passage of boats through the locks?—Decidedly.

7578 At the present time I believe the Commissioners do not receive any tolls for passage of boats through the locks?—Not for small boats, that is the privilege of the lock keeper.

7579. Might not that fairly be made a source of income to the Commissioners?—Decidedly so.

7580. Would it be of any great amount?—I should think the traffic upon the river would be considerable if the Commissioners had it in their own hands. The navigation has been very much neglected for many years by the present Commissioners, and when the railways commenced the Commissioners ought to have bestirred themselves to compete with the railways, but instead of that they leant to them and took shares in them.

7581. If the river was put into a proper condition, and the tolls lowered, so as to be able to compete with the railways, do you think the navigation might to some extent be restored?—I have always thought so; many things would be carried over the Thames that now go by railway, provided people could get them carried at the same price.

7582. If the river was put into a good state do you think there would be any passenger traffic from town to town?—The locks are too close together I think, we have one lock at Marlow, another at Temple mill, half a mile up, and a quarter a mile further up there is a third.

7583. What time does it take to pass a boat through a lock?—About ten minutes, sometimes less; it depends upon the condition of the locks. A lock will take in several pleasure boats at the same time.

7584. Have you observed whether the water comes down more rapidly now than it used to do?—Yes, it flows into the river much more quickly.

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7585. Does it rise to any greater height?—No.

7586. Does it pass out more or less rapidly?—More rapidly, on account of the new bridge we have; the old piled bridge blocked up the water a good deal.

7587. In summer, when the water is least in quantity, is it less than it used to be?—No, I think the water is as good as it used to be, only the drainage above causes the water to flow into the Thames quicker than it used to; the water does not stop on the land so long.

7588. (*Professor Way.*) If the water comes more rapidly into the river would it not cause a greater flood?—Yes, but it passes away; we do not get the floods we used to do.

7589. (*Chairman.*) What is your opinion as to the quantity of water passing down in the dryest part of the season now as compared with a few years ago?—When I was younger the water was much lower than it is now. We used to have a flash of water twice a week, and in order to get that they drained the river four miles; after that flash had passed away there was no water for days together in short water time.

7590. (*Professor Way.*) Then the flashes have made that difference; you cannot very well compare that time with the present, you cannot say whether there is less water now?—We do not find that deficiency of water that we used to do. My opinion is that you should get rid of the present Commissioners and get some fresh ones.

7591. The present Thames Commissioners are not a very efficient body?—No; there are a lot of people who are Commissioners who do not care anything about it.

The witness withdrew.

Mr. W. Cresswell.

Mr. William Cresswell (of Great Marlow) called and examined.

7592. (*Chairman.*) Do you reside in Great Marlow?—Yes.

7593. How many years have you lived here?—All my life.

7594. What is your occupation?—A farmer. I used to be on the water as a bargeman.

7595. How long is it since you first worked on the water?—Twenty-five years.

7596. Have you seen much difference in the state of the river bed?—I have not seen much difference.

7597. Have you found any difficulty as a bargeman in entering and passing through the locks of the river?—There was a lock where we had a difficult matter to get in sometimes, the Bells at Ouseley, below Windsor.

7598. What was that owing to?—The shallowness of the water; it wanted ballasting a little in the cut there.

7599. Where do you farm?—In Marlow. About 100 acres.

7600. Does any of your land adjoin the river?—Yes.

7601. Is it subject to flooding?—Yes.

7602. To what extent is it flooded?—The flooding is nothing of any importance, it is flooded occasionally, but if I apply to the lock-owner, he lowers the water.

7603. Is your land injuriously flooded?—I think the flood does as much good as harm.

7604. Have you been accustomed to fish on the river?—Yes.

7605. What kinds of fish are generally caught?—There used to be salmon caught here when I was a youngster. I have seen salmon from 20 lbs. to 30 lbs. weight a piece.

7606. Have you seen many of them?—I have seen a good number.

7607. How many years ago is it since you saw any salmon?—Forty-eight years ago.

7608. What fish are taken now in the river?—Plenty of jack and perch, and a few trout.

7609. Is the quantity of fish in the river greater or less than it was years ago?—Fish are not so plentiful as they were.

7610. (*Professor Way.*) To what do you attribute the disappearance of the salmon?—People seem to say that, owing to the filth and steamboats in London, the fish cannot work up out of the sea.

7611. Have you observed much difference in the growth of weeds in the river?—When we do not get a showery summer the weeds are not so numerous.

7612. Have you observed at what depth the weeds grow?—In the shallowest water, in 5 feet of water, is about the depth where they grow most.

7613. Do you think they would grow in 12 feet of water?—Yes, there would be a few, but you do not see them on the surface.

7614. (*Chairman.*) If the weirs were all done away with, and the Thames allowed to flow in its natural channel, the water would be diminished in depth probably?—Yes.

7615. Would the weeds in that case increase?—I suppose it would make very little difference.

7616. Do you know the eyotts and islands below the lock?—Yes.

7617. Have they altered their position?—Yes.

7618. Do they occupy a greater area in the river than they did?—Yes, I think they occupy more of the water than they used to do, taking it as a whole.

7619. (*Professor Way.*) Can you tell us about the cesspools of this town?—I have had a great deal to do with cleaning them out at times.

7620. Is it the fact that the liquid part drains away into the gravel?—I have no doubt that part of it does.

7621. How often are these cesspools emptied?—In some cases once a year, in others once in three or four years. The contents are generally taken on to the land as manure.

7622. The refuse is never thrown into the river?—It is too valuable for that, but I have known instances of the contents of cesspools being thrown into the river.

7623. Under what circumstances?—I suppose it was done for convenience, and to save expense, it was carried away in buckets and "chucked" into the Thames.

7624. Is that a thing which often occurs?—I have known it to occur several times, but people have not of late dared to do it, since there has been an inspector of nuisances.

7625. That practice is now put a stop to?—(*Mr. Stallwood.*) I think that it is now done at the waterside, but it is always done in the night.

7626. There is nobody to interfere with them then?—No.

7627. (*Chairman to the witness.*) Have you police in the town?—Yes.

7628. Is it their duty to look after these things?—Yes, and they generally do. People are confined to certain hours during which they may clean out cesspools, that is all the control that is exercised.

7629. Do the police not interfere if there is a discharge of sewage into the river?—I never knew them to do so.

The witness withdrew.

G. H. Vansittart, Esq.

George Henry Vansittart, Esq. (of Great Marlow), examined.

7629*a*. (*Chairman.*) I believe you were lately member for Berkshire?—Yes.

7630. Are you the owner of property on the banks of the Thames?—I own property about three miles along the banks of the Thames; I have lived on the river, and I have known it ever since I went to Eton.

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7631. Where is your property situated?—Just opposite the town. I live a mile above, and my property extends to a mile below the town.

7632. Is much of your land subject to flooding?—Yes; my lands are considerably affected by the high floods.

7633. Is the land injuriously affected?—If the flood comes over ploughed land it does an immense deal of injury; my grass land is not affected by the high floods in summer, it is not low enough for that. The flooding in winter does not, I think, do any harm to the grass.

7634. Do the meadows stand high above the level of the water?—My own meadows are sufficiently high, but that is not the case with many about here; very great complaints have been made above me. Sir William Clayton has made many complaints of the way in which he is flooded by water in summer; he stated that he had had all his hay spoiled after it had been cut through the water being penned up by the mill.

7635. (*Professor Way.*) What you wish, I suppose, is to have a control over the water, to let it on for irrigation when required, and then to let it off?—Not to let it on for irrigation; we cannot do that, but we desire to prevent the water lying so long on the land in very wet seasons. The water should not be penned up injuriously; at the same time it should not be let down too much, for then the river becomes unwholesome; when there is occasion to draw down to repair locks, whether a drain comes in or not, there is an exceedingly bad smell in the river.

7636. You would be willing to part with any advantage that is supposed to attach to flooding upon meadow land if you could secure an immunity from over-flooding?—Certainly; I may add that I have observed for the last 20 years the time that the water takes in coming down; I now find after a heavy rain on the average only three days and seven hours, sometimes only three days, elapse before the water reaches its highest, whereas it used to take over six days. I do not speak now of snow water, which comes down more quickly.

7637. To what do you attribute that alteration?—To improvements in draining; the many cuts in which arterial drainage has been made and several other causes. Just about here we have been very much relieved from the water by two causes, one is the bridge, the other that an immense quantity of water near Shotte's brook and the forest, which used to come down into the Loddon above Henley, now goes down by drainage into the Thames below Maidenhead.

7638. Is the Loddon not so subject to flooding as it used to be?—I think it does not affect the Loddon, but it certainly does affect this part of the river.

7639. (*Chairman.*) Have you observed the weirs at the different locks and mills, and is there much difference in the facility for passing down the water?—Of course it is natural that people should wish to keep all the water they can, but if the weirs and locks were in good order and the regulations of the commissioners were obeyed, we should not be hurt by the water being penned up; there is no doubt that some mills above me do inconvenience certain land a little.

7640. I believe Temple mill is not at work now?—No.

7641. When it was at work was it injuriously affected by the tail-water being up against the weir?—Yes, I have often heard so.

7642. And from mill to mill I suppose the same matter was complained of?—Yes.

7643. Would not a fixed overflow weir remedy that by preventing millers interfering with the discharge of water from the pen?—I do not think it would, a fixed overflow weir might be kept for the summer level; but we have in all these weirs locks at the side and by taking up the paddles we let the water down; in winter a great part does not go over the weir, and I do not think a fixed overflow would affect it; more would depend upon proper regulations for the benefit of all as to keeping the water up at a proper level in summer.

7644. Have you observed the quantity of water that comes down in a droughty season?—I have paid great attention to it, and my observations have led me to this conclusion, that we have now not anything like the quantity of water that we had 20 years ago: I can give you an instance—before I came into possession of the property, but while I lived there, we built a brick wall as a defence against the river, the foundation was laid so as to be 2 feet underneath the summer height of the river, for some time I never saw the foundation of the wall, it was all under water, but now the water continually runs down so as to leave part of the wall exposed. I have had stones put in and made another contrivance to keep the soil from washing out.

7645. Within your recollection was the system of flashes carried out in this part of the river?—I do not recollect there being any great amount of flashes down the river; I imagine that on this part of the river they took place chiefly before proper locks were made; I can remember that in the different shallows barges used to stick, but now I do not ever see such a thing; I think there is no great complaint to be made on this part of the river, and that the depth of the water is sufficient for the size of the barges.

7646. Was it within the last two years that were so dry or was it before that you observed the foundation of the wall to be exposed?—Both within the last two years and also before that. I think in proportion to the fall of rain, the evil is increasing every year.

7647. Considering the quantity of water that goes down in a dry season, have not millers very great power to keep back the water in those long reaches?—No doubt.

7648. If the mills above had been working freely, and had lowered the water in those long reaches after working for some hours, and then penned the water back, might that not check the flow of the water almost altogether in the river?—No doubt that could be done, but I think that the regulations, if enforced, might prevent that.

7649. Are the regulations not enforced?—I am afraid not so well as they might be; but after all it must be said that funds are necessary. As a Thames Commissioner, I think I may say, considering the funds we have had to deal with, that we have not done badly.

7650. (*Professor Way.*) Ought there not to be a regular inspection of weirs?—No doubt; that is one of the things I wish most to secure.

7651. (*Chairman.*) Have you made any observations as to the traffic on the river?—Yes; both as a commissioner and as living in the district, I have made many observations, and I am sorry to say that the traffic is steadily decreasing, and it must decrease from the nature of things.

7652. Do you attribute that decline to the railway system?—There is no doubt that the original cause was the competition brought to bear by the railway system; but if we, as commissioners, had larger powers, I think there is no reason whatever for supposing that the river traffic would be so injuriously affected, provided a fair system of tolls was introduced. I believe that in the case of towns like this, that are more conveniently supplied by the river, the trade would, with a fair system of tolls, be restored to the river. I also believe that there would be a great traffic between towns on the river. I was told by a person wishing to bring goods from Reading to Windsor that the mere tolls on the river would be in excess of the railway rates between the two towns, and that is a thing that we, as commissioners, have no power to alter.

7653 It was stated in evidence at Reading that if the river was put into proper condition a traffic in coals and other merchandize might be carried on upon the river in steam-tugs at such rates as to compete with the railways?—I used to get inland coals by the river, but I was obliged to discontinue it, chiefly because there were so few barges going that there was no certainty. I am nevertheless perfectly convinced, even

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without steam, that the towns on the banks of the river might be supplied by water more cheaply with large heavy goods than by railway.

7654. When the Temple mills were at work do you know how they obtained their supplies?—All their coals were received by water, or nearly all.

7655. And latterly did they so receive materials for the manufacture of paper?—No; they received them by railway.

7656. In all probability they would receive them by water if they could get them carried at a moderate rate?—Most things from London would no doubt be brought cheaper by water. I imagine that the river can compete successfully with railways in all heavy articles and in some others where there is a direct communication by water, but not in cases where they have not uninterrupted communication. That holds good with an immense quantity of traffic; for instance, goods from Worcestershire and other counties above which can be brought by canal, and goods from below too.

7657. Is there any probability of the railway being brought nearer to Marlow than Marlow Road?—It has been talked of.

7658. Is any bill about to be promoted for that purpose in the ensuing session?—(*Mr. Rolls.*) I believe there is.

7659. (*Chairman, to the witness.*) I suppose that the irregularity in the delivery of goods brought by the river now is the great cause of that means of conveyance being discontinued?—It is a complete bar to it in certain things, oilcake or corn for instance.

7660. (*Professor Way.*) In the case of coals, time is perhaps not so important, one barge would follow another?—If the barge owner buys the coals there would perhaps be no difficulty; but if you buy them yourself and have to deliver them on a particular day, the uncertainty of barge transit is a complete bar to such a business.

7661. Are you acquainted with the drainage of Great Marlow?—I do not know the drainage of the town, but I continually pass up and down the river in a boat, and I pass by the mouth of the drain which has been spoken of. I have never perceived any large amount of sewage water coming in or any offensive smell. The chief complaint that I have heard has been as to an accumulation of a bank of mud opposite Mr. Cox's house. As a magistrate here for many years, I can say that we have never had a complaint made to us while I have been on the bench about cesspools, or of the police not attending to that matter.

7662. Have you taken any interest in the fishery upon the Thames?—The quantity of fish has certainly fallen off, and that may have arisen partly from the number of anglers; but I imagine that it is decidedly more attributable to the refuse thrown into the river from the paper mills.

7663. Have the eyotts below Marlow altered?—They alter very much indeed; in some cases they gain, and in others lose. The banks consist of a loamy marl which is very easily washed away; but I have not thought it worth while to do anything respecting them.

7664. Do the eyotts occupy a larger area of the river?—Yes. I think the meadow adjoining has lost what the eyotts have gained.

7665. Do your fishery rights extend across the river?—Yes.

7666. Have you any right to mow the grass upon the bank on the opposite side?—I have no occasion.

7666*a*. (*Chairman.*) Do you consider that the bed of the river belongs to you?—There is no doubt that the Thames Commissioners have rights which extend over the river for ballasting necessary for the purposes of navigation; but I consider that I have a right to the bed of the river, and if I wanted ballast I should not be charged for it. I have only to add that I have looked very much into what has been stated as to the insufficiency of depth of water in the locks, and I do not think that any inconvenience exists in that respect. Indeed now barges can pass more freely than they used to do.

7667. (*Professor Way*). You think barges would not be too large if the river was improved?—No.

7668. (*Chairman.*) Would it not be desirable, if there was an increase of traffic, that the barges should navigate from here down to the Pool?—Certainly.

7669. Then should not the river here be made more suited for barges that navigate the lower part of the river?—If our barges can get down to the Pool that is all that is required.

7670. (*To Mr. Cresswell.*) What depth of water is there now upon the sills, when the water is shallow?—I should say 3 feet 6.

7671. Is 3 feet 6 different from what it was 10 or 20 years ago?—There was less water over the sills in years past than there is now. They have lowered the sills in some places.

(*The witness.*) A witness has stated that it would take 10 minutes to open a lock and get through. I have continually done it in four minutes. With a barge you can open the lock quicker than with boats, because you can let the water in faster.

7672. With management you might pass through a lock in two or three minutes?—Yes.

7673. Do the shoals below Marlow lock affect the flooding of the land adjoining?—Not in the least. There is a tremendous fall over the weir. If we could only ensure the water being let out regularly here, when there is a rise of water. as far as I am concerned, I should receive no injury, but there is no doubt that the two weirs do pen the water up very much upon certain meadow land, which makes it liable to summer flooding. Much good might be done by the regulation of these things.

7674. Are there shoals below Temple lock?—No, not to affect the flow of the water; but the river has silted up, and the weeds have grown enormously. I think we have four times the quantity of weeds we used to have, and the navigation greatly affects the weeds. They will grow in water at a very considerable depth

7675. Have these weeds much effect upon floods in summer time?—No doubt. If you get a flood after the weeds have begun to grow, say in July, they would have a great effect, but I do not of late years remember a flood so late in the year. I recollect one in the end of June, but then the weeds were hardly grown enough to have much effect. As an owner and occupier of land my interest in these matters are very great, and I should be anxious to have some efficient local control. The drainage should not be injured, and the land should not be flooded.

7676. As a landowner, do you think that if the Thames was to be cleansed and otherwise improved, you would object to a certain moderate rating for that purpose?—As a landowner I do not think that I should profit very much by anything of the kind; but I should not object to a moderate rating, with proper guarantee for its expenditure.

7677. Does that reflect the general feeling of landowners in this neighbourhood?—I cannot speak for others, except in one instance. I may add that I do feel the great evil of the old body has been that we have no power, and also that we are a very large and cumbersome body, and therefore can do nothing.

7678. Do you think there would be any objection on the part of the riparian proprietors to the Thames being put under the Thames Conservancy?—As that body exists, there must be a good many persons who have not much interest in this part of the river, or knowledge of it. The board of management ought not in any case to be too numerous.

7679. If there was one representative for Marlow and for each of the other large towns, it would not materially increase the number of the board?—I am afraid it would be so. If you had two representatives for Berkshire, one for Bucks, and one for Oxfordshire, and then two for the towns, that would be quite enough.

The witness withdrew.

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Col. B. W. Knox.

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Colonel B. W. Knox (of Marlow) examined.

7680. (*Chairman.*) Were you a member of the select committee of the House of Commons which inquired into the river Thames?—I was.

7681. Do you agree generally with the report of the committee?—Yes, I do. On two or three points I differed; as a whole I think the report carries out the general views of the committee.

7682. (*Professor Way.*) Mr. Neate, I believe, was opposed to handing the river over to the Conservancy?—Yes, and so was I, if the landowners and the persons interested in the upper navigation of the Thames were in no way represented.

7683. The recommendation of the committee was, "That this management should be in the hands of "'the Conservators of the Thames,' with such addi-"tion to their number as a due regard to the proper "representation of the local interests of the upper "navigation may require?"—Yes; Mr. Neate and I had that part of the recommendation amended. I believe the general view of the committee was that there should be only three representatives of the upper Thames appointed to that board, so as not to make the board too large.

7684. (*Chairman.*) If the upper Thames were represented you think that there would be no objection to placing the whole river in the hands of the Conservancy?—None whatever.

7685. Is that the opinion of the riparian proprietors in this part of the Thames?—I have spoken to many proprietors on the upper Thames, not only in this neighbourhood, but in various parts down below Maidenhead, to Mr. Venables and others, and I think the general desire is not to get too cumbersome a board, but that there should be a section representing the upper interests of the Thames.

7686. Is there any reasonable prospect of a profitable return from the restoration of the navigation?—I think we had that very clearly put before us, that if the navigation was really put into an efficient state, and the tolls lowered to a uniform rate, there would be greater traffic brought on to the river. Nobody will embark in the speculation of trading on the river, the insecurity is so great that any day the navigation might be stopped, and there would be great loss to traders.

7687. I presume that a thorough reparation of the Thames would be very beneficial to the land that is now subject to floods?—I have no doubt of it; the whole thing has been most grossly neglected.

7688. Seeing that that would be the result of an improvement of the river would it not be reasonable to rate the land on each side for the restoration of the Thames?—I did not find much favor with my colleagues on the committee. A water highway should be maintained as well as a common highway. I placed before the committee calculations to show that a very small rate would raise a sufficient sum to put the whole navigation into repair, but then there came the difficulty as to how far the area of rating should be extended.

7689. I presume that if it was proposed to levy a rate throughout the whole county for the restoration of the Thames there would be very great objection made to it?—Yes, more particularly in this county, it is a peculiar county, very long, and if you rated the people at Newport Pagnell for the improvement of Marlow and Henley, at this end of the county, I think there would be great objection and difficulty.

7690. (*Professor Way.*) In addition to the traffic which would, as you say, benefit the towns in the neighbourhood of the Thames is not the river the great material drain of the land?—Certainly.

7691. Some evidence was given yesterday at Lechlade that the state of the river impeded the drainage of land not absolutely on the banks, but uplands; if so anything that was done to improve the river would be a benefit to land some distance from it?—No question of it.

7692. Do you suppose that if one of the conditions under which the river was handed over to the conservancy was that the whole of the navigation up to Lechlade should be repaired they would undertake it?—I really do not think, from what we gathered from the secretary of the board, that the Conservancy Board would like to undertake anything above Oxford.

7693. If three members were sent from the upper districts to the new Conservancy Board do you think they should be elected?—Yes, certainly.

7694. The question has been asked whether the present body of Commissioners could properly act as a constituency for the election of the new members?—I think that that is a very good suggestion, or the representatives might be chosen by the county magistrates at quarter sessions, but it is a question which requires to be well looked into.

The witness withdrew.

G. H. Vansittart, Esq.

George Henry Vansittart, Esq., further examined.

7695. (*Chairman.*) There is something further that you wish to state?—Yes; first, in reference to the power of rating, I think that that ought to be strictly limited, I, for one, have a fear that the board of conservancy being better off than we are would spend money in rather a lavish way, and I think there ought to be strict limitations put upon the power of rating. Then, as to the question of representation, I think that the quarter sessions of the counties and perhaps the corporations of boroughs might meet and elect members to represent them on the board—that would bring rather more than three, but perhaps six would not be too many.

The witness withdrew.

Mr. G. J. Dyson.

Mr. George Joseph Dyson (of Harleyford) examined.

7696. (*Chairman.*) Where do you reside?—At Harleyford; I am bailiff to Sir William Clayton.

7697. How far do the meadows extend along the river?—For a mile and a half, perhaps.

7698. How much of the land is subject to flooding?—Perhaps 10 or 12 acres; there are some 15 or 18 acres of college land at Meadenham subject to be flooded, 10 or 12 of these are under water now.

7699. Is that land injuriously affected by the flooding?—Yes, where the water drives.

7700. Are there any removable causes to which you attribute this flooding?—At Temple mills they do not draw their floodgates and lock up soon enough; we have made complaints sometimes about that.

7701. Were those complaints attended to?—They have been for three or four years perhaps.

7702. There are a number of eyotts opposite?—Several.

7703. Do they belong to Sir William Clayton?—Yes.

7704. Have they altered in extent within your recollection?—Not at all.

7705. Are there shallows in the river adjoining those eyotts?—Yes, occasionally.

7706. Do they tend to increase flooding?—Not at all.

7707. Have the weeds increased of late years?—Yes, very much within the last 3 or 4 years.

7708. Do the weeds increase flooding in summer?—Not at all; they keep the water back a little I think.

7709. Is Sir William Clayton's land situated below those eyotts?—Opposite to them.

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7710. If they keep the water back does that subject the land above to flooding?—No; there is a weir and a lock just above us at Harleyford; sometimes if the floodgates are not drawn out early enough our meadows are flooded half a mile off; I have known us to have hay in summer almost floating about, particularly on Sunday and Monday morning.

7711. Do you take any steps to remove the weeds?—Yes, we cut them every year.

7712. What do you do with them?—We let them drift down.

7713. Are they liable to be stopped at the weirs below?—I have never heard of that.

7714. Do the proprietors above Harleyford lock cut their weeds?—I do not know that they do; I think that Sir Gilbert East's tenant sells the rubbish in the river.

7715. Do they take it out of the river?—Yes, and use it for packing apples.

7716. You do not do that, you pass your weeds on? Yes.

7717 (*Professor Way.*) I think you stated that the water drives: what do you mean by that?—I mean where it washes everything before it off the land; where the water settles it gives a sort of artificial dressing that does good.

7718. And wherever there is a rush of water it does mischief?—Yes.

7719 (*Chairman.*) It has been stated in evidence that where the water stagnates it does harm, but when it flows over the land it does good, but in your case, if it goes rather too fast over your land, it does mischief?—Yes.

The witness withdrew.

Mr. T. Wright.

Mr. Thomas Wright (of Temple) examined.

7720. (*Chairman.*) Where do you reside?—At Temple.

7721. To whom are you agent?—Colonel Williams.

7722. He is member for Marlow?—Yes.

7723. How much of the land abutts upon the Thames?—About ¾ of a mile.

7724. Is that nearly opposite Sir William Clayton's property?—It is opposite.

7725. To what point do you wish to draw the attention of the Commissioners?—In reference to the flooding of the adjoining lands. Occasionally it will happen that the new lock above us is drawn without giving us information, and that throws the water on to Sir William Clayton's land, on the low ground. Ever since I have had anything to do with the lock, I have drawn it immediately when I have received notice, and done all I could to liberate the water.

7726. Is the land immediately around the house sometimes subject to flooding?—With a high flood we might have 20 acres flooded, and all the ground round the house.

7727. Does the water pass freely away, or does it stagnate?—During an overflow of the Thames we shut our gates into the trout stream, and take away the back water, so as to prevent a flood of Mr. Vansittart's land. After the water has come down to the level of the banks, we open the gates and take all the water off the estate, and it comes down into the reach below.

7728. The locks above you are sometimes opened without notice being given to you, so that the water passing down towards your lock occasions a flood. What remedy would you suggest for that?—That we should have proper information as to drawing the new lock above. Ours is an excellent lock with what they term "rymers," they are 9 inches wide by 3, and they are put in on account of retaining the water for the use of Temple mills.

7729. What is the width of your lock?—24 feet.

7730. Can you take all the rymers out?—Yes, and leave a clear space.

7731. How long would it take to remove the rymers?—Four people could get them out in 20 minutes.

7732. To what height do the rymers pen the water above the sill?—There are about 7 feet of water at that lock.

7733. How many sets of rymers have you?—There are about 30 of them.

7734. Is there any other point?—In reference to the contamination of the water by the refuse from the paper mills, I may say that the paper mill at Temple is shut up, but we hope that it will soon be let.

7735. To whom does it belong?—To Colonel Williams. Of course the refuse passes into the creek and into the Thames, but that I do not consider does any injury, or contaminates the water. We net the Thames, and close to the mouth of the creek we get ten times more fish than in any other part.

7736. What paper do they make at Temple mill?—Newspaper.

7737. Have you not seen any dead fish there?—No.

7738. How far is Temple house from the paper mill?—About 200 yards.

7739. Have you not heard any complaints made by the residents of the nuisance of the paper mills?—None whatever, the water always appears to have got clear before it reaches the Thames.

7740. (*Professor Way.*) Is that creek cleared out from time to time?—It has not been cleaned out for these five years.

The witness withdrew.

Adjourned till the 16th January.

Worthing, Tuesday, 16th January 1866.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., IN THE CHAIR.

John Thornhill Harrison, Esq. | Professor John Thomas Way.

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W. H. Dennett, Esq.

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William Hugh Dennett, Esq., (of Worthing,) examined.

7742. (*Mr. Harrison.*) You are clerk to the local board of health?—Yes, under the Public Health Act.

7743. When was that board appointed?—The Act of Parliament was applied for in 1852.

7744. What is the extent of the parish of Worthing?—Worthing is a district part of the parish of Broadwater.

7745. Have you carrried out a system of sewerage in the town of Worthing?—Yes, and the sewage is applied over 25 acres of land.

7746. To what extent has the town been sewered?—Throughout the entire extent.

7747. What is the rateable value of the district?—At the end of the last financial year, that is up to the 30th of June, the rateable value was 18,050*l.* 14*s.* 0*d.*

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7748. What is the population living within that area?—About 7,000. I am speaking of the resident population.

7749. When was the sewerage carried out?—Between 1852 and 1857.

7750. What was done with the sewage?—It used to be carried by drains down to Seamill's bridge, which is the natural outfall of the Bray district, and there discharged into the sea.

7751. Were any ill effects experienced along the coast from the sewage being discharged into the sea at that place?—None, that I am aware of.

7752. Since the date you have given I understand that the sewage has been applied to the land?—Portions of the sewage.

7753. What becomes of the remainder?—The land receives what it requires, and the rest goes into the sea according to the old plan. The company who have the irrigation works have separate iron mains leading on to their land, and the sewage can be directed either on to the land or taken into the sea.

7754. A company for the utilization of the sewage has been established?—Yes, it was formed in November 1863.

7755. When did they begin their operations?—Towards the end of last year they began to put the sewage upon the ground, but there was great delay in preparing the land for it.

7756. How many acres of land did the company purchase?—42 acres.

7757. You stated, I think, that the sewage was applied to 25 acres?—Yes.

7758. What sum has been expended by the company in purchasing that land, and in preparing it for the application of the sewage?—About 7,032*l.*

7759. What items does that amount include?—The purchase of the land, levelling and laying out of the pipes, and doing all that was necessary to the 42 acres.

7760. I believe that part of the 42 acres is occupied for brickmaking?—Yes, the reason why, in the first season 25 acres only were put under irrigation was that some other crops were necessary, as a matter of husbandry, accordingly potatoes and oats were planted and sown.

7761. After only one year's experience it is hardly possible to judge how far the experiment will be remunerative as a speculation?—Our accounts are now being prepared for the auditors, but I should say generally that the experiment is remunerative.

7762. Have you ever heard that the application of the sewage to that land is injurious to the health of persons living in the neighbourhood?—Never, and I do not believe it is the case.

7763. Have you visited the ground when the application of the sewage has been going on?—I have visited it nearly three or four times a week. I have been there when the sewage has been all over the surface of the field.

7764. Has the application of the sewage made a very marked difference in the vegetation?—Yes, a very palpable one.

7765. When you have visited the ground have you been sensible of any disagreeable effluvia?—I was once in August last. I asked the reason, and the man who attended to the field, and who is here, explained, as he will explain it again, that the smell was preventible. By some omission the sewage had been allowed to lie in the slack too long, beyond that I never experienced anything disagreeable.

7766. You consider that the application of the sewage to the land has not in any way been injurious to the health of the people in the neighbourhood?—Not in the least.

7767. (*Professor Way.*) In what direction do the fields lie?—To the east of this town.

7768. Has it been asserted that smells are perceptible in the town when the wind blows from the east?—I never heard of it, and I may add further that the wind from the east very rarely blows here. I have some memoranda before me which will give you some information upon that point. At our pier the Royal National Lifeboat Institution have requested us to take particular notice of the barometer and of the wind.

7769. Have you an anemometer there?—Yes, and observations are very carefully taken. The following are the returns made to me for several months of last year. The wind blew

	From E.	From N.E.
May	2 days	1 day
June	1 „	5 „
July	0 „	0 „
August	0 „	1 „
September	2 „	7 „
October	0 „	5 „
November	0 „	7 „
December	2 „	4 „

7770. August was the month in which you noticed the smell?—Yes, I think it was about that time, it was in the summer.

7771?—Did it last for any time?—For a few hours only.

7772. (*Mr. Harrison.*) You experienced the smell on the spot?—Yes.

7773. (*Professor Way.*) But you do not think smells have been noticed at other times?—Quite the contrary, I am at the place constantly, and I really do not experience any smell whatever. I mean close upon the spot.

7774. You have given the population as 7,000; do you know how far that number is increased by visitors?—I have generally understood that there are in summer about 3,000 visitors, in addition to the fixed population. I mean from July to September or October.

7775. (*The Chairman.*) The company was formed in 1863?—Yes, but no sewage was put upon the land until the autumn of 1864.

7775*a*. You have just had 12 months trial?—Yes.

7776. The company which has undertaken the irrigation, is a limited liability company, and is bound to publish a report?—Yes.

7777. Have you found any difficulty in disposing of the produce?—None.

7778. Do you feed any cattle upon the land?—Yes, our own horses.

7779. Do you feed any cows?—No; but we have applied the water to some of the adjoining meadows.

7780. When you have had it in excess?—No, we can spare it very well for that, we don't use one quarter of the sewage sent down.

7781. You are under no obligation to use all the sewage of the town?—No, according to the arrangement we can send down the main sewer what we do not want.

7782. The outfall to the sea was constructed before hand?—Yes.

7783. (*Mr. Harrison.*) You do not apply the whole of the sewage of the town to the land?—No, only a very small proportion of it; at least I believe much the larger quantity goes to the sea.

7784. (*Professor Way.*) We wish to know how much you apply per acre?—I cannot tell you that, but I may say that besides growing grass we make hay.

7785. Have you any difficulty in making it?—No.

The witness withdrew.

Mr. Thomas Edgar (of Worthing) examined.

Mr. T. Edgar.

7786. (*Mr. Harrison.*) You are town surveyor?—Yes, under the local board.

7787. How long have you been so?—About 4½ years.

7788. Have any sewerage works been carried out in the town during that time?—Only a very small proportion, the rest were all constructed before.

7789. Have the works for the application of the

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sewage been carried out since you were surveyor?—Yes.

7790. Have you been employed in carrying them out?—Very little indeed, not at all under the local board. What I have done has been done for the company.

7791. Can you state the area of the district that has been sewered?—About 205 acres.

7792. What number of houses drain into the sewers?—In round numbers 1,213.

7793. How many waterclosets are there?—1,480.

7794. Can you give us any information as to the population of Worthing? — The present resident population is considered to be about 7,000; by the last census it was about 6,000.

7795. How many visitors are there?—3,000 is generally considered the highest number.

7796. At what periods of the year are visitors generally resident here?—From the middle of July to the end of September or October.

7797. For the remainder of the year the population consists of permanent residents?—Yes; there are some few visitors even in winter time.

7798. When you were first appointed, was the sewage of the town carried into the sea?—Yes.

7799. Last summer I believe you made some observations as to the application of the sewage to the land?—Yes.

7800. It was applied at three different times during the day?—Yes.

7801. Can you give me the result of the experiment; first, the quantity that was applied at the different times, and next the quantity that flowed off the land?—I have not got those particulars by me now, but I will supply them.

7802. In a general way can you give us the result of the first application of the sewage in the morning?—The whole of the first application was absorbed, none flowed off. From the application in the middle of the day, a slight proportion flowed from the land.

7803. In what condition?—There was a little feculent matter in it.

7804. What was the result of the third application in the evening?—That was between 11 and 12 o'clock and the running off finished at one in the morning; a very considerable portion of the sewage came off the land the third time, in condition pretty similar to that which flowed off at noon.

7805. What is the nature of the soil?—Chiefly clay.

7806. Had it been drained?—Not at all that I know of, except by an ordinary sewer passing through it, there is no subsoil drainage but there is a natural fall on the surface.

7807. What was the fall from the upper part of the field to the lower?—I will furnish those particulars.

7808. I think you stated to me that there was a fall of about 17 feet from the upper part to the lower?—Yes.

7809. According to the section there are some parts of the land nearly level?—Yes, some between the upper end and the middle carrier, the upper part is pretty nearly level.

7810. Do you think the sewage is likely to rest on those level parts?—No, it does not rest upon them.

7811. Did you lay out the carriers on this land?—No.

7812. Have you observed any results from the distribution of the sewage over the land arising from the carriers not having been properly laid out?—Yes, in certain places the edges of the carriers are too high, and that causes a basin between the two carriers, and the sewage rests in the basin. In the next laying out after the present crop has been removed, I have no doubt that the company will put that matter straight.

7813. Have you remarked the growth of the crop on the places you have referred to?—Yes.

7814. What has been the difference?—On some places the land gets barren and the crop is thin where the sewage does remain, provided that it does not stop so long as to kill the root, you have a greater body of grass.

7815. That would lead to the notion that such a formation was desirable, do you think so?—It may be desirable for the growing of grass, if you could carry it out for a certain time only; but the sewage once on must remain, unless grips are cut across to take it off.

7816. Have you considered what would be the best system of laying out carriers, supposing you had a slightly falling piece of ground similar to that which the company have purchased?—I would lay out carriers as those of this company are laid out.

7817. Are they not so laid out that the sewage sometimes flows out of the carriers across to the opposite side of the pannel without being distributed over the surface?—That is owing to the land not being properly levelled.

7818. Could you not lay out the principal carriers so that the sewage from them should distribute itself evenly over the pannel?—I do not think it possible to keep them in that condition, because that would bring you to the system of contour carriers.

7819. Rather to the system of placing the main carriers at right angles to the contour carriers?—Yes, but I do not think that would act.

7820. Have you laid out the piece of land which the company have lately purchased?—Yes.

7821. In what way?—Exactly in the same way as the 40 acres have been laid out, with this exception, that it has been levelled.

7822. Are the carriers carried directly down the field?—They will be when they are put in.

7823. Would it not be well if you could have the ground nearly level from one pannel to the other?—Yes, the more level the better.

7824. Therefore, generally speaking, it would be desirable to lay out the carriers at right angles to the contour lines?—Yes, but then it must be remembered that carts have to be taken on to the land to fetch the grass off; in one case these carts have not to go across one pannel, for the men can see when they get to the field where a pannel is being mowed, but if you had carriers made at right angles to the main carriers the carts would have to go across the carriers, and you would have to keep men at work to keep the carriers open.

7825. The produce I believe is sold to persons who take it away in carts?—Yes.

7826. Do you confine them to one pannel at a time?—Just to that pannel which has been last mowed.

7827. According to the mode in which you have laid out the land, do you find any difficulty in applying the sewage to a pannel shortly after you have mowed it?—None in the least that I am aware of.

7828. Have you experienced any nuisance from the application of the sewage to the land?—No, I have been frequently over it. I do not know whether my sense of smell is bad, but I never can smell anything.

7829. You see no objection on that score to the application of the sewage to the land?—Not the slightest. You can drive along by the sea almost at any time, and not smell anything, within a very short distance from it.

7830. Have any complaints been made to you as to the sewerage of the town?—None at all, no more than will happen under any system of sewerage. There are occasional stoppages, but they are caused more by neglect of people than by any defect in the system.

7831. If you cannot pump all the sewage on to the land there is an outfall sufficient to carry what remain, away into the sea?—Yes.

7832. Is the system of applying the sewage to the land a constant or an intermittent one?—It is only conveyed on to the land when it is required.

7833. What becomes of the sewage in the interval?—It is pumped down the main and passed into the sea when it is not wanted upon the land.

7834. In the intervals does it run away without impediment?—No, it has no chance; it accumulates in the sewage well until it is lifted into the outfall.

7835. Is the effect of that to back up the sewage?

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—Yes, to a certain extent, but only for the time during which it is allowed to accumulate.

7836. If the system were more perfect would it not be desirable to have the sewage constantly pumped up by the engines, instead of letting it accumulate in the sewers?—You could not constantly pump, the pumps could not get hold of the sewage.

7837–8. For what reason?—Because if you keep constantly pumping, you would necessarily pump down to a certain level, and then the sewage very likely would not get into the well, but would remain in the bottom of the sewers; you must pump the well out, so as to take the last run of the sewers the most solid matter.

7839. Do you think that now any ill effects arise from backing up the sewage in the sewers?—I think not, the time it is backed up is too short.

7840. You have made some observations I believe upon the quantity of produce from different rods of land?—Yes, and I will supply you with them.

7841. (*Professor Way.*) If I understand you rightly the company takes as much of the sewage as they like?—Yes, they send word if they want it, and it goes on to their land so many times a day.

7842. Do they pay a certain sum to the local board for pumping?—They do not pay anything for the first seven years.

7843. Then the quantity they may take makes no difference?—No.

7844. You have no difficulty in arranging that matter so long as a friendly feeling exists between the two parties, but if there was any difficulty or misunderstanding, could the company enforce the pumping?—Yes.

(*Mr. Dennett.*) They can enforce it. The Local Board have given a lease of the sewage.

7845. (*Mr. Harrison.*) Will you supply the Commissioners with the terms of the lease?—(*Mr. Dennett.*) I will.

7846. (*Professor Way, to the witness.*) I think you stated that the land consisted of stiff clay not drained?—Yes.

7847. Then I suppose nine-tenths of all the sewage run over, and not into the land?—No, our main outfall runs through the middle of the land, and a great portion of the sewage finds its way down into the trench.

7848. And oozes out of the ground below the level?—Yes.

7849. Still I presume a great quantity does overflow?—Yes. After the first application there is an overflow, but that all depends upon the season and upon the condition of the land. When these observations were made it was a very dry season, and the land was baked.

7850. There are some soils in which all the sewage of such a town as Worthing might sink down over such an area?—Yes; but there is not any soil about here of that kind.

(*Mr. Dennett.*) The clay is from 2 or 3 feet deep, it is a clayey subsoil.

7851-2. (*Mr. Harrison, to the witness.*) You made some observations I believe upon the quantity of hay obtained from a certain quantity of grass?—Yes.

7853. Four patches of a rod each were measured and mowed on the 11th of September?—Yes.

7854. And one produced at the rate of 3·89 tons of grass per acre. The second at the rate of 5·83 tons per acre, the third 7·63 tons per acre, and the fourth 12·96 tons per acre?—Those were the quantities of the grass.

7855. The result in hay was from the smallest quantity of grass 21.3 cwt., from the second quantity of grass 34·7 cwt., from the third 45·8 cwt., and from the fourth 51.8 cwt.?—Yes.

7855*a*. Have you ascertained how much the grass diminishes in weight by being converted into hay?—I cannot speak to that.

7856. If the larger quantity lost about four-fifths of its weight, and the others only about two-thirds, that would shew that the heavier crops were much more watery than the others?—Yes.

7857. Do you find that those who come to buy hay prefer, for certain purposes, that which does not come from the largest crop of grass?—I cannot answer that question.

7858. (*Professor Way.*) They buy it by measure and not by weight, do they not?—Yes.

(*Mr. Dennett.*) When the crop is light, more than a rod is given to the purchasers.

7859. (*Mr. Harrison.*) Has not the sea washed over the parade lately?—Yes, several times.

7860. What becomes of the water that comes into the street?—It passes back to a very large extent into the sea.

7861. Through the gravel?—Yes, and with the surface water, it drains back into the sea.

7762. Have you found any difficulty in getting rid of it?—We always have a difficulty, because we have not a sufficient number of surface drains. Sometimes it has not gone away in an hour or two.

7863. I observe by a notice in the local paper of last week that you have brought under the consideration of the local board the want of ventilators in the sewers?—Yes.

7864. Had you not done that before?—No.

7865. How are the sewers now ventilated?—I have been told by one of my predecessors, that there are several ventilators in the shape of stack pipes, but I do not know where they are, other than there is no ventilation. That matter has been referred to me to certify, and to be re-considered by the board.

The witness withdrew.

Mr. WILLIAM FORD TRIBE (of Worthing) examined.

Mr. W. F. Tribe.

7866. (*Mr. Harrison.*) Mr. Dennett has been asked about the population, and he stated that the resident population was about 7,000?—Yes. I have had occasion to look into that with reference to police matters, and I should say that there were at least 8,000 permanent residents, not taking into account visitors.

7867. Can you give the correct number of visitors?—Mr. Dennett's estimate of 3,000 is about fair.

7868. For how many months in the year are the visiters resident?—The larger number for about four months in the year.

The witness withdrew.

Mr. GEORGE GREENFIELD (of Worthing) examined.

Mr. G. Greenfield.

7869. (*Mr. Harrison.*) Are you manager of the sewage irrigation works?—I have been since October last only.

7870. Did you take an interest in the subject before you became manager?—Yes.

7871. To how many acres has the sewage been applied?—To 25 acres.

7872. Can you state what proportion of the whole sewage of the town is pumped upon those acres?—No, I cannot.

7873. To how many acres at a time is the sewage applied?—We open all the carriers, and we carry the sewage through an iron pipe. We open three iron junctions, according to the sewage that comes down. The sewage well is emptied three or four times every day, and the sewage cannot back up except in cases of storms. We have no accurate measurements at present, but we soon shall have now.

7874. You sell the produce I believe at so much a rod?—Yes, but sometimes, when the produce is thin, we give two rods for one, therefore to take the rods would not be accurate. From the 22nd of April

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1865, 25 acres of land were put under sewage, and the quantity of grass sold to the end of December, amounted in money 584*l.* 18*s.* 6*d.*

7875. In selling the grass you reckon to get a certain growth upon a rod?—Yes.

7876. What is the quantity?—We have weighed it at various points, the thinnest, and the thickest, and the average. The first growth when we had plenty of sewage was 2 cws. 2 qrs. 22 lbs. per rod, making rather more than 20 tons per acre.

7877. You obtained 20 tons per acre all over the 25 acres?—Yes, I think so. I cannot speak exactly to it, because about the latter end of April or May I went away, and then the management was left to some one else. I can speak accurately since October last.

7878. How much do you receive per rod?—1*s.* a rod.

7879. What weight do you reckon that you give?—It is impossible to say; some of them would not weigh three quarters of a hundredweight. In some cases the grass would run a great deal more than 1 cwt., say double, when there is a first growth; the grass is very succulent, and the blade is strong; the grass measured 4½ feet, and had no weeds with it; it killed all other weeds. It was rather over 20 tons to an acre, according to what we calculated, and we weighed the grass at several places at different times. As to the second crop I cannot speak, because I was away at the time; we got very little comparatively in the three or four next crops; I think about 45 tons on the whole. But we could not get sewage; the weather was very dry. Altogether we had five crops, including the first.

7880. What kind of grass have you sown?—Italian rye grass.

7881. When was that sown?—Some at the latter end of last September twelvemonth, and some in the latter end of June, but the drought killed the greater part of this last, and accordingly we sowed again in September.

7882. Did you crop it all that autumn?—We mowed a little of it, but not much.

7883. You left it for next spring?—Yes, the greater portion of it.

7884. What have you received otherwise than from the sale of grass?—49*l.* for sewage given to two meadows which lie contiguous; then we took in horses to keep for which we received 20*l.*; we sold one rick of hay for 45*l.*, and we have got another in hand, a small one, which is estimated at 30*l.*; we have had nothing else out of the 25 acres.

7885. What did you receive for the grass sold?—584*l.* 18*s.* 6*d.*

7886. (*Professor Way.*) What do you estimate to be the total value of the crop of Italian rye grass?—710*l.* 18*s.* 6*d.* for the 25 acres.

7887. For the first season?—Yes.

7888. (*Mr. Harrison.*) Have you included in that estimate the keep of your own horses?—No, we have that extra; I put "nil" down for them.

7889. What were the expenses connected with the application of the sewage to the land?—The labor and horse keep amounted to 230*l.*

7890. Did that 230*l.* include the preparation of the land for irrigation?—No, the land had been prepared before, and the greater part of the field levelled. Mr. Edgar was mistaken in what he stated as to the soil; for, instead of its being stiff clay, part is a very fine bed of sand, the rest good brick earth.

7891. To what depth was the drain through the field?—I cannot state.

7892. Do you reckon that 230*l.* represents the annual expense?—Yes.

7893. (*Professor Way.*) How many men do you employ?—Four.

7894. At how much per week?—15*s.* for four regular men; then we pay 6*s.* a week to a man for keeping the accounts. I put the horses down at 30*l.*, independently of the grass.

7895. Do the persons who buy the grass fetch it away?—Sometimes they do, and sometimes we send it. We send sometimes to Shoreham, and we sent to Brighton on one occasion.

7896. Have you any difficulty in disposing of the grass?—We have not.

7897. (*Mr. Harrison.*) Have you carried out any works this year which you will not have to to do next year?—Sometimes, when the horses are not employed, we have sent them to get some beach rock to mend our roads with.

7898. (*Professor Way.*) The chief of the items making up the 230*l.* is 150*l.* for labour?—Yes.

7899. That you must still continue?—Yes, and the 30*l.* for the horses.

7900. What other expenses have you to meet?—Tithes, 25*l.*; taxes, 18*l.*, and interest of money, 75*l.*

7901. How much for management?—There has been nothing for that.

7902. (*Mr. Harrison.*) That makes a total expenditure of how much?—348*l.*

7903. (*Professor Way.*) As against about 700*l.*?—Yes.

(*Mr. Dennett.*) Some portion of the land was levelled this year—where the oats were.

(*The witness.*) That was when I was away.

7904. (*Mr. Harrison.*) Are you a member of the local board?—Yes.

7905. As a member of the local board, are you aware whether any complaints have been made of the application of the sewage to the land?—Not in the least.

7906. Have the neighbours never made any complaint?—On the contrary.

7907. Have you perceived any swell to arise from the sewage?—No. On the occasion of which Mr. Dennett spoke we were irrigating at the eastern part of the field, and at the western part the pipe was full; the man had omitted to put up the valves, and the sewage remained in the end of the pipe for a short time, and when let out it caused a smell; but I know that hundreds of ladies have walked down there, and not one of them has spoken of the smell.

7908. Have you any complaint made in the town?—I never heard of any.

7909. (*Professor Way.*) I understood you to say that your crop is Italian rye grass?—Yes.

7910. Has not that to be broken up occasionally?—Yes, once in five years.

7911. Does Italian rye grass grow over the whole 25 acres?—Yes.

7912. If so, and you have to break it up, say, in three years, what will you do then?—We thought of ploughing the field up, making it perfectly level, and then resowing the Italian rye grass.

7913. Is that the usual course?—No, but I think, with the system of irrigation, the field will quite bear it. I believe we are generally inexperienced with regard to Italian rye grass; we have grass now that stands 2½ feet high.

7914. Are you enlarging your works?—We have bought 11 acres and a rood of land since.

7915. (*Mr. Harrison.*) What amount was expended for the waterworks and sewerage of Worthing?

(*Mr. Dennett.*) Originally about 18,000*l.*; since then there has been 5,000*l.* expended upon additions and alterations—about 23,000*l.* altogether.

7916. How did you obtain the money?—We borrowed it, to be paid off, part within 30 years, and part within 50 years.

7917. What rate have you to levy upon the town to meet that repayment?—We levy a general district rate of 3*s.* 9*d.* in the pound, to include everything, not sewerage only.

7918. Does the expenditure include keeping roads in repair?—Yes. We have another rate, which is a paving rate, under the old Local Act, which amounts to about 220*l.*; but that is principally applied to the payment of interest on monies borrowed a great many years ago.

7919. I believe the water is all pumped from the chalk?—Yes, and we have just had it analysed by Professor Redwood.

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7920. (*Professor Way.*) Is the water satisfactory?—I believe nothing can be more so.

7921. It is hard water?—Yes.

7922. Does it curdle at all with soap?—No.

(*The witness.*) With regard to those slacks that Mr. Edgar spoke of, the backing of the sewage is occasioned by our stopping the middle carrier, we stop that carrier when we irrigate at the top of the meadow; then the sewage water is let off; if we let it off by degrees, the sewage will be a little longer draining off; but, as we have pipes through the bottom carrier, it does not lie on for more than two hours.

7923. Do you agree with Mr. Edgar that where it does lie on for a short time longer, it increases the crop?—It does for the moment; but it kills the grass afterwards; that will be prevented in future.

The witness withdrew.

William Harris, Esq., Surgeon, (of Worthing,) examined.

W. Harris, Esq.

7924. (*Mr. Harrison.*) Are you resident in Worthing?—Yes, and I am practising here.

7925. How many years have you resided at Worthing?—33 years.

7926. Have you been thoroughly acquainted with it through all the stages of its improvement?—Yes.

7927. Do you think that the health of the town has improved or otherwise?—It has certainly improved.

7928. Within what time?—Since the sewerage has been completed.

7929. Has that shewn itself by a diminution of the death rate, or in the general healthiness of the people?—I cannot answer with precision as to the diminution of the death rate. The healthiness of the people has generally improved.

7930. Is there less fever?—Yes.

7931. Do you attribute the fevers that formerly prevailed to the cesspool system?—Entirely so.

7932. You find now that that source of fever is removed by the system of drainage which has been carried out?—Entirely; we have nothing of the kind.

7933. Has any nuisance been caused or mischief done by the application of the sewage to the land?—I have not observed any, and I have been in the habit of walking over the ground constantly.

7934. (*Professor Way.*) May we take the smell of which Mr. Dennett spoke to have been an accidental occurrence?—Yes. I have had no patient in the immediate neighbourhood who has had fever.

7935. Has the state of the weather in the past year been such that you might have expected fever?—I think so.

7936. (*Mr. Harrison.*) To what in particular did you attribute the fevers at the time when the cesspools were in existence?—The cesspools were never cleaned out in a proper manner, and they used to smell very much indeed; in some instances also the privies were very bad indeed in the dwellings of the poor people. I speak now of 20 years ago when I had the parish to attend to.

7937. At that time how was the town supplied with water?—From wells entirely.

7938. Were the wells in any places near the cesspools?—In a great many places, and the cesspools oozed into the wells; matters were so bad as that.

7939. Did any cases of that kind come under your notice?—Yes, and cases of fever.

7940. Did you attribute the fever to the people drinking the water so contaminated?—There was every reason to suppose that the cause was bad water as well as the miasma arising from the cesspools.

7941. Have you studied the action of miasma arising from cesspools upon health?—I have not made any particular observations upon that subject.

7942. (*Professor Way.*) It is not at all known to the profession, I believe, what actual substances in the air produce miasma?—I do not think it is.

7943. (*Mr. Harrison.*) Do you consider that it arises from decaying organic matter?—Decomposed animal matter would throw out a miasma very prejudicial to health.

7944. More so than from decaying vegetable matter?—Yes.

7945. Have you examined the water now supplied to the town?—No, but I believe the water to be perfectly pure; it contains nothing but the chalk. It is an artesian well, 365 feet deep, with a cylinder of 75 feet, and no sewage could possibly get into it.

7946. I see by the analysis that there is carbonate of lime in it—14·5 grains in a gallon; what effect would that have?—It would act as an astringent.

7947. Not make persons who drink it unwell?—Not at all.

7948. Do you think that water containing that quantity of carbonate of lime is not prejudicial to health?—Yes; I have not observed that it has been so. I believe the water to be perfectly pure, and as pure as any water you can get. It is not very hard, and what hardness there is is very much lessened by boiling. The water when it has been boiled amalgamates very well with almost every kind of soap. I drink the water every night of my life and twice a day, and to me there is nothing so refreshing.

7949. I presume that carbonate of lime makes it rather refreshing than otherwise?—Yes.

7950. (*Professor Way.*) You believe that the sewage irrigation works are not likely to be prejudicial to the health of the town?—I have never heard any single individual complain of them at all. I judge myself merely from having visited the place frequently. I have often walked down there, and I never perceived anything that was disagreeable or offensive.

7951. As a physician of long standing, do you believe the works will be at all injurious to the health of the inhabitants?—No.

7952. (*Mr. Harrison.*) Is the result that the sewerage works have been very beneficial to the town, and the application of the sewage to the land has produced no injurious effects?—Yes.

The witness withdrew.

Mr. George Hodes (of Worthing) examined.

Mr. G. Hodes.

7953. (*Mr. Harrison.*) You are engineer to the local board?—Yes.

7954. You manage the pumping establishment at the waterworks?—Yes.

7955. What horse power have you there?—Two engines together equal to 40 horse power.

7956. Do you work them together?—Sometimes.

7957. What quantity of coal do you consume?—About 24 cwt. a day.

7958. What is the price of that coal?—It varies from a guinea to 25*s.*

7959. What are the expenses per week?—About 4*l.* or 4*l.* 10*s.* a week. The expenses have been considerably more lately; the pumps having been in about nine years we have just had them taken out of the well and repaired and replaced.

7960. Does that 4*l.* 10*s.* include oil and cotton?—No.

7961. What are the other items?—About 1*l.* a week would cover all other expenses.

7962. What is the depth of the well?—65 feet.

7963. How many feet does it go into the chalk?—The whole of it, with the exception of about 12 feet at the surface; but there is a boring 300 feet beyond the 65 feet of well.

7964. Of what size is the bore hole?—Twelve inches.

7965. Throughout the whole depth?—No.

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(*Mr. Dennett.*) For the first 100 feet it is 14 inches and for the remainder 12 inches.

7966. (*To the witness.*) What quantity of water do you pump daily during the eight months when there are no visitors here ?—About 95,000 gallons a day.

7967. And when the visitors are here ?—About 140,000 gallons a day.

7968. What height do you pump the water ?—100 feet.

7969. Is that from the level of the water in the well ?—From the surface of the ground.

7970. What is the level of the water in the well below the surface of fhe ground ?—8 feet 6.

7971. When you are pumping steadily do you lower that much ?—We lower it 65 feet.

7972. For how many hours a day do you pump the water ?—That will depend upon what state the pumps are in. Just lately, the pumps having been newly repaired, I have pumped 65 feet down in 12 minutes, and consequently if I waited for the water I should have to stop those pumps once in 12 minutes.

7973. How many horse power have you at work when you do that ?—Sixteen ; it draws at the same time the sewage pumps, which are three in number and are 15 inches in diameter.

7974. What height do you pump the sewage ?—Thirty feet in one case and about 39 in the other.

7975. That depends uoon whether you pump to the upper part of the field or to the middle of it ?—Yes, whether I pump down the old drain or one of the new ones.

7976. How many hours a day do you regularly pump the sewage ?—It not regularly pumped. It summer it varies according to the weather from 10 to 12 or 14 hours a day. At this time of the year we pump night and day.

7977. Can you give us the quantity that you pump in a day in the dryest season of the year and now ?—50,000 gallons an hour, but that of course depends upon the speed and what state the pumps are in when they are lifting quite their fill.

7978. Is all the sewage you pump applied to the land ?—Not the whole.

7979. What proportion of it is applied ?—During dry weather in summer we have pumped the whole on to the land, but if there has been any difficulty or derangement of the works, or it has not been convenient to pump the sewage down there it has gone down the town main to the sea.

7980. Can you give us the quantity of sewage that has been pumped on to the 25 acres during the last 12 months ?—Altogether, 99,000,000 gallons.

7980*a*. (*Professor Way.*) The sewage water which you pump would, according to your calculation, be equal to 600,000 gallons in a day ?—Yes.

7981. How do you account for the difference between the 140,000 gallons of water which you pump for the town and the 600,000 gallons of sewage that you pump for irrigation ?—By the springs. Of course at this time of the year spring water gets into the drains along with the sewage.

7982. (*Chairman.*) In summer does any overflow take place between the time of your ceasing to pump and the time of your beginning again ?—No.

7983. Then you actually pump all that comes from the land and the whole of the sewage ?—Yes.

7984. If you pump for 14 hours out of the 24 there are 10 hours during which the sewage accumulates and you do not pump ?—Yes, we pump three times a day.

7985. During last summer have you delivered the whole of the sewage you have pumped in any one day upon the land ?—Yes.

7986. For many days ?—Yes.

7987. On those days the sewage goes on just as effectually as if it ran on from the sewers by gravitation ?—Yes.

7988. But diluted with five or six times its quantity of water ?—Yes.

7989. At the present time you do not pump the whole of the sewage on to the land ?—No, very little indeed during the last six or seven weeks.

7990. (*Mr. Harrison.*) In summer the whole of the sewage and drainage water is pumped on to the land ?—Yes, except when there is anything the matter at the works and we cannot do it ; of course it is not uniform.

7991. (*Chairman.*) At the present time, although you are not pumping the sewage on to the land, you are pumping through the ordinary outlet and it passes into the sea, and when the floods are out as at present there is an overflow into the Teville stream ?—Yes.

7992. I observed this morning that all the meadows below were flooded ?—Yes.

7993. That is in consequence of land floods, and not in consequence of anything you are doing ?—Yes.

7994. Have you materially lessened the great nuisance that existed in the Teville stream in summer before you began to pump on to the land ?—Yes, materially so.

7995. That which you put on to the land ceases to create a nuisance either in the open waterworks or at the outlet ?—The Teville stream has not worked this summer on account of some accident ; it has been shut out entirely.

7996. So far as the sewage is concerned, last summer you purified the Teville stream entirely ?—Yes.

7997. And even the outlet to the sea to a great degree ?—The well has never been allowed to rise high enough to overflow.

7998. When you have delivered it into the ordinary outlet it would not pass into the Teville stream but it would run into the sea ?—Yes.

7999. When the sewage is put upon the land, does the water flowing off into the watercourse at the bottom go off in a clear state or in any degree foul ?—This has been the first year, and of course it is necessary to gain a little experience. I believe that by properly working that sewage we can drain the water from the land in a perfectly clear state.

8000. Clear to look at ?—Yes, but this has been the first year.

8001. I would infer from that that the sewage which has been passed over the surface of the land has occasionally not gone off quite clear ?—Yes, it has been so.

8002. Have any complaints been made by the adjoining landowners of anything disagreeable ?—I have heard none.

8003. Has the brook been fouled so as to be offensive since the irrigation works were commenced ?—Not the least.

8004. Is the brook at the bottom of that field so fouled as to be offensive ?—Not in the least.

8005. Have you spring water enough now for the supply of the district ?—Yes.

8006. (*Professor Way.*) It was stated just now that the residential population was 8,000, and that the floating population was about 3,000. I understand that you supply 95,000 gallons a day in the winter, and that is 10 or 12 gallons per head ?—Yes.

8007. Is that a constant supply ?—Yes.

The witness withdrew.

Mr. W. Verrall.

Mr. WILLIAM VERRALL (of Worthing) examined.

8008. (*Mr. Harrison.*) What is your occupation ?—I am assistant overseer of the parish.

8009. Can you give the number of deaths per thousand which have occurred in different years since 1853 down to the present time ?—I have not made that calculation. The population at the last census was something like 6,500 or 6,600, including Broadwater. It has increased between 1851 and 1861.

8010. I observe that the amount expended in parochial relief and out-door maintenance, was 1,853*l.* in 1849, and in 1865 it was only 1,119*l.* with an increased population. How do you account for that ?

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—By the great amount of work done, and by the smaller amount of sickness among the poor. The diminution is owing, to a very considerable extent, to the latter circumstance.

8011. There appears to have been a remarkable difference since the time when the sewage was carried away from the town?—Yes, in the last two or three years particularly. A large number of new houses have been erected in the town, and the people are pretty fully occupied. There is no question that the population has considerably increased in that time.

8012. What has been the comparative number of deaths in the parish in 1863 and 1865?—The number of burials in the parish in 1863 was 115, and in the last year, 1865, 113, with a larger population.

8013. Have you observed that the health of the town has decidedly improved?—Most decidedly. I have a table, which I will hand in (*handing in the same.*)

8014. Have you heard complaints in consequence of the sewage being carried upon the land?—None whatever. The eastern part of the town contiguous to the lands where the sewage is applied has been and is the most healthy locality in the parish.

The witness withdrew.

Mr. JAMES LONGLEY (of Worthing) examined.

Mr. J. Longley.

8015. (*Mr. Harrison.*) You are the bailiff of the company by whom the sewage is applied to the land?—Yes.

8016. Have you been employed upon the works since the commencement?—Yes.

8017. Have you had under your control the application of the sewage?—Yes.

8018. To what quantity of land do you apply the sewage?—To 1½ or 2 acres at each time.

8019. Do you get it delivered upon the ground at different times in the day?—Sometimes it is pumped once in a day, and sometimes also in the afternoon and in the evening. It is not a regular thing.

8020. You put it on the land when it comes to you?—Yes.

8021. Have you an opportunity of seeing what quantity passes by you and is carried out into the sea?—Yes.

8022. Is much of the sewage of the town carried into the sea?—A great deal now.

8023. Are you applying any sewage to the land now?—Not lately.

8024. For how long have you not applied it?—I cannot say. Sometimes we have it for a day, and at other times it passes away for six or seven days.

8025. Is that when they do not pump it high enough for you to apply it?—That is when they do not pump it into our main at all.

8026. During summer, in the dry season, is any of it pumped into the town main?—Yes, but all the heaviest parts of it go into the sea.

8027. Have you taken any steps to prevent it from being taken out to sea?—Yes, and we are now able to turn it over the lower part of our land, but at present it runs into the sea.

8028. In future, during summer time, will the whole of the sewage, both liquid and solid, be intercepted at your farm?—Yes.

8029. For how many hours do you keep the sewage on the two acres to which you apply it?—That is according to how long they pump.

8030. You do not change it at all during the time they are pumping?—No.

8031. You let it flow on to the land as long as they pump?—Yes.

8032. Whether they pump for three hours or for six hours?—Yes.

8033. What is the longest time that you have known them to pump?—I cannot tell exactly.

8034. Could you not turn the sewage on to a greater number of acres?—Yes, and I have sometimes lately turned it on to four acres.

8035. How soon after a crop has been cut and taken off the land do you apply sewage again?—As soon as we can make it convenient to get it on. However we have been backward in getting the sewage on close enough after the grass has been sown. The works have not been just right; they have not sent the sewage to us rightly, or we should have used a little.

8036. Are you still cutting the grass?—No, not now.

8037. You have some grass pretty high now, have you not?—Yes, very high; we want to cut it early in the spring.

8038. At what height does it stand now?—Something over a foot high.

8039. When will you begin to cut it?—If the weather permits, in March.

8040. Is there not some below the north side of the contour more than 2 feet high?—It is, perhaps, 1½ feet high in some places there.

8041. (*Professor Way.*) Why should you not put the sewage on in frosty weather?—We fancy that it would kill the plant. If you could keep sewage running over the land, it would keep the frost away from the plant, but in a cold windy night the sewage would all freeze up.

8042. Does not the grass freeze if you do not put the sewage on?—Yes, but the frost does not hurt it so much then.

8043. (*Mr. Harrison.*) Have you cut a rod at times and weighed it?—Yes.

8044. You sell it by the rod?—Yes.

8045. At the same price always?—Yes; but sometimes we are obliged to give 3 and sometimes even 6 rods for 2. At least, we had to do so last summer, when the crop in some parts of the field was very short, through not having had sufficient sewage.

8046. What would a fair rod weigh?—Some of the last crop weighed about 1 cwt. and 1½ cwt. The first crop weighed, part of it, over 3 cwt., and other part 2 cwt. and 3 qrs.

8047. Do you find, from the way in which the land is laid out, that the sewage distributes itself evenly over the land?—In some places, where the land is not level, it does not.

8048. Where the sewage passes over the land freely, do you find that you get the best crop?—Yes.

8049. Where the sewage stagnates in a flat place upon the land, what is the crop?—It does not do for the sewage to lie dead.

8050. If the sewage flows past a spot without touching it, there, I presume, you do not get so good a crop?—Not on those brows where you do not get a continual run.

8051. The object should be to let the sewage flow as regularly over the land as possible?—Yes.

8052. When the sewage continues on the land for sometime and passes off to the bottom, in what condition is it?—It goes off quite clear.

8053. Have you heard any complaints made of the smell arising from the sewage?—No.

8054. (*Professor Way.*) Are there any houses near?—A few. I live on the spot with my family.

8055. Have you or your family experienced any inconvenience?—No, only on one occasion, which has been mentioned, and that was from my neglect.

8056. (*Chairman.*) What neglect was that?—In not slushing the drain. The water that is in this end of the drain was confined, perhaps, for a week or ten days, or longer, and when let out it caused a smell, from having been stagnant.

8057. (*Mr. Harrison.*) Have you ever applied that thick slush stuff to the land?—Yes.

8058. When did you put it on?—A month ago or more.

8059. What has been the effect upon the crop?—To make it grow tremendously, and we shall be able

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to tail during another summer a great deal more upon it.

8060. If you had continued to pass that thick stuff into the sea, the company would have been losing a good deal by it?—Yes, I am confident of that.

8061. Can you give any idea as to what proportion of the sewage goes on to the land during a year; or for how many months is the whole of the sewage pumped on to the land?—I cannot tell you that, but we have been pumping almost every month since we have been there at different times. It has left off for the last month.

8062. The greater proportion of the sewage in the winter months is not pumped on?—No.

8063. Last winter did you pump it on to the land during the frost?—Yes, we tried it.

8064. Could you not keep the sewage steadily flowing over the land?—No, the frost killed some of the grass, and we had to sow again. If you could keep the ground continually under water as long as the frost lasted, it would not hurt.

8065. Could you manage the irrigation more satisfactorily if the sewage was pumped steadily on to the land the whole of a day?—Yes, if it was a regular thing, it would be a great deal better.

8066. (*Professor Way.*) The grass is bought by cowkeepers, and for horses?—Yes, for both.

8067. Persons come continually to you for it?—Yes.

8068. Are they pleased with the quality of the grass?—Very much so; it produces richer milk and more cream than ordinary grass.

8069. Do cows and horses eat it eagerly?—Yes.

8070. How long before cutting do you leave a crop without sewage?—If I could have sufficient sewage I would water each crop three times.

8071. How long would you think it necessary to wait after the last dose before you cut the crop?—About a fortnight.

8072. After that time I suppose the grass is free from anything that would be objectionable to horses?—Horses do not mind anything; if you flooded the grass, and cut it up the same afternoon and gave it to horses, they would eat it all the more ravenously.

8073. As a matter of fact, how many times do you apply the sewage upon each crop?—Sometimes twice, and sometimes only once.

8074. In 5 crops that would make 8 or 10 applications?—Yes, but we have been very irregular; things have not been quite right.

8075. If you could have the sewage regularly pumped to you, so that you could use it when you pleased, should you use a larger quantity upon the 25 acres?—Yes.

8076. And you could do so with advantage?—Yes.

8077. (*Chairman.*) What height is your crop generally before you cut it?—From 3 to 4 feet.

8078. As high as 4 feet?—Yes, and over that, I believe?

8079. In the very best growing weather, last summer, what time did it take to grow that height?—We have had a crop in 30 days over the whole 25 acres. I think the grass has grown about 6 inches a week in the summer with plenty of sewage.

8080. If your crop was a couple of feet high, would you have any objection to apply sewage to it?—No. I should like always to do it before I cut it.

8081. So as to keep the roots of the grass moist and in a growing condition?—Yes, and to make the next crop come in quicker and forwarder.

8082. (*Mr. Harrison.*) If it were not for the cutting up of the ground by the carts you would like to give the grass a flooding immediately before you cut it?—Yes.

8083. And as soon as it was cut you would like to flood again?—Yes.

8084. (*Chairman.*) Have you grazed at all upon the land?—We have two horses now grazing on it.

8085. Belonging to the company?—No, horses taken into keep.

8086. Would there be any objection to grazing on the land during winter?—I should not like to do much of that upon this land; it would pinch it so wonderfully.

8087. You say that cows fed with the grass produce better milk?—Yes.

8088. Have you been told that by persons who purchase it for their milking cows?—Yes.

8089. Has there been any cattle disease here?—No, not that I am aware of.

8090. You stated that some of the sewage after passing off your land was distributed over some meadows below?—Yes.

8091. Have you observed what disposition the cattle shewed there to eat the grass?—Yes, I saw one that was ravenous after the sewage had been on.

8092. Have you seen cattle go on to the land when the sewage was upon it?—Yes, and eat the grass up out of the water.

8093. (*Mr. Harrison.*) If you had two samples of grass, one more flaggy and luxuriant than the other, and two persons came, one wanting grass for cows and the other for horses, which would they each prefer?—The flaggy sort will suit cows. Purchasers all pitch upon the young flag for cows, the blade produces milk so much more than the stalk.

8094. A man who wanted grass for his horses would not take the heaviest, but that which had more stem?—Yes.

8095. Although in quantity it was not so much?—Yes.

8096. (*Chairman.*) Did you make any hay last summer?—Yes.

8097. Of what weight?—We do not know that exactly; it is in stack now.

8098. Have you sold it?—Part.

8099. Do you think you made hay with advantage during the last summer?—We would much rather sell the grass green.

8100. If you had not a sale for the green grass, and the weather was suitable, you would have no objection to making it into hay?—No.

8101. Does a large quantity give you trouble to get dry?—Yes.

8102. What length of time was there from cutting the grass to stacking it?—About five days. The hay was carried a little too soon. The cattle liked it very much indeed.

(*Mr. Greenfield.*) The cattle will leave trifolium incarnatum for the grass.

8103. (*Mr. Harrison.*) Do you mean hay made of the trefolium?—No, the trefolium green grass.

8104. (*Chairman, to the witness.*) What effect had the sewage upon the meadows that you flooded?—They produced more than double the quantity as compared with meadows not flooded.

8105. Did the owners of the flooded meadows cut the grass and make hay, or feed it off?—They made it into hay.

8106. And they got a heavier crop?—Yes.

8107. (*Professor Way.*) Was the sewage with which you flooded these meadows sewage in its ordinary state, or had it passed over your land first?—It had passed over our land in one field, but not in the other.

8108. Was there any difference in quality between the two?—Only a trifle.

8109. After passing off your land the sewage was still capable of doing good to those other meadows?—Yes.

8110. (*Mr. Harrison.*) Might the sewage, after passing from the top of your field down to the bottom, be then put upon other land with advantage?—With a little advantage, but sewage coming from the top of our field would not be very strong; it would have traversed such a long distance.

8111. You get almost the whole of the goodness out of the sewage?—Yes.

8112. (*Chairman.*) Can you put it on twice now?—Yes, when we have done the top part we can then do the bottom part.

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8113. Is there an intercepting drain by which you can put it on to the lower half after it has gone over the top half ?—Yes.

8114. (*Mr. Harrison.*) If you pass the sewage from the middle ground over the lower land, do you get all the goodness out of the sewage ?—No.

8115. If you had those meadows below your land, between it and the brook, would it not be an advantage to you ?—Yes; we could cleanse all the sewage before it passed away into the ditches more thoroughly than we do now.

8116. And have a larger crop of grass from the land adjoining than what grows there now ?—Yes.

The witness withdrew.

William Tribe, Esq. (Churchwarden of Worthing), examined.

W. Tribe, Esq

8117. (*Mr. Harrison.*) Are you resident in Worthing ?—Yes.

8118. For how many years have you resided there ? —50 years or more.

8119. Are you a member of the local board of health ?—I am.

8120. How long have you been a member ?—About six years.

8121. Has the health of the town been improved by carrying out the works ?—No doubt of it.

8122. You have seen the sewage carried out on to the land ?—Frequently.

8123. And passed by when it has been carried on ? —Yes. I have been over the ground frequently.

8124. (*Chairman.*) You own the adjoining land do you not ?—Some on the south and some on the west.

8125. Has the irrigation caused any nuisance to your property ?—Not the least.

8126. Have you heard it complained of by any other parties ?—I have not. The first time I heard of it smelling unpleasantly was from Mr. Dennett this day.

8127. Are you the churchwarden of the parish ?—Yes.

8128. As churchwarden, I suppose the health of the inhabitants has come under your notice ?—Yes.

8129. Do you think it has improved of late years ? —I do most certainly.

8130. Are there any facts connected with it that you could give the Commissioners ?—We publish every year an account of the names of all the paupers, and you will see by the list the very great ages to which they live, there are a great many 77 years of age and upwards.

8131. I believe the death rate here is about 15 in 1,000 ?—I believe so.

8132. Has the amount expended in parochial relief very much diminished within the last 25 years ?—Most certainly.

8133. Notwithstanding the increase of the population ?—Yes.

8134. We may take that diminution to be a sign of the improved healthiness of the poor people ?—It has a great deal to do with it. Comparatively there have been fewer deaths among paupers than among the higher grades in this parish.

8135. (*To Mr. Dennett.*) Have all the small tenements waterclosets in your parish ?—Every house in the town within a certain area has a watercloset.

8136. Is there any trouble in making people attend to them and keep them in proper order ?—A little, we have been forced to appoint an inspector.

8137. (*To Mr. Edgar.*) Are there waterclosets generally in the town ?—Yes.

8138. Have you any trouble in having them properly attended to ?—Yes, there is a good deal of carelessness, but as much in large tenements, on the part of servants, as in smaller ones. There is apparently a desire on the part of the lower population to keep the closets perfectly clean, and they are generally so, I think. The inspector goes round every three months to see whether taps and valves are in perfect order, and he reports to the local board; if he finds any deficiencies, he holds back his report until after he has been a second time round to see that they have been remedied.

8139. Have you much trouble during frosty weather ?—We never have much here.

The witness withdrew.

Walter Goodyear Barker, Esq., M.D., (of Worthing,) examined.

W. G. Barker, Esq.

8140. (*Chairman.*) Are you a medical man resident in Worthing ?—Yes.

8141. For how many years have you resided here ? —For 18 or 19 years.

8142. Did you practice in the town before the board of health was formed ?—Yes.

8143. Had you any practice in Worthing before there was any system of sewerage introduced ?—Yes.

8144. Were you intimately acquainted with the character and type of disease that prevailed then in Worthing ?—Yes.

8145. What was the type of disease at that period ? —It was what is called gastric fever, but it is called more properly intestinal fever or typhoid fever.

8146. At that period there were cesspools in the town and wells for the supply of water throughout the town ?—Yes.

8147. Had the cesspools any connection through the stratification with the wells ?—Yes. I knew a very great number of wells in which the water was perfectly unfit for human consumption.

8148. Had that anything to do with the type of disease which you saw prevailing then ?—I have no doubt the water had a great deal to do with it, but in my opinion the air we breathe is infinitely of more consequence than the water we drink.

8149. Is it not quite possible that a town may be perfectly sewered with houses drained and water supply quite unobjectionable, and yet you may have a state of things which shall tend to engender disease, for example, if the rooms are overcrowded, and if the houses are not properly ventilated ?—Undoubtedly.

8150. Do you know whether, as a rule, the waterclosets in this town have a permanent fixed means of ventilation and for the escape of foul air, which is never closed, and which the servants of the house cannot tamper with ?—I do not think that is general. I consider that there should be two doors between every watercloset and the interior of the house, and that the window should be open to the external air and should never be shut. If that were so we should not hear much of contamination.

8151. Has there been much sickness in Worthing during last autumn ?—Yes. On Thursday the 26th of October a great deal of rain fell ; the sewage could not get away into the sea, and the houses throughout a great part of the town were flooded on the basements. My own house with two kitchens was flooded, and most of the houses near. On Saturday the 4th of November I was not at all well. I thought it was from cold. I was shivering and had every feeling of depression. On Sunday I was a good deal worse, and I was quite poorly for three or four days. I mentioned the circumstance to my servant, and she said that she felt in the same way, only that she was a great deal worse and had suffered from diarrhœa. After that a good many other cases came under my notice in the town, and the particular symptoms of the complaint were sickness and diarrhœa. A great many of the cases became typhoid in their character, and terminated fatally. My impression is that we owe the epidemic which took place in the town entirely to that flood, which sent the sewage water over the surface of the town to a very large extent, but I believe that evil is quite capable of being remedied.

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8152. Is it not possible that the same type of disease might occur in individuals and become epidemic where no such flooding had taken place, perhaps from some atmospheric cause?—I think I may say this, that there can be no such thing as a fever without a local cause. The general atmospheric conditions will not in themselves produce a fever, but by particular local conditions fever will be generated, and once generated, it soon runs over the town. People have said there was no flood at Park Crescent, where the sickness was as bad as anywhere else: no, but there may have been an old nurse or an old washerwoman who may have gone with flannel waistcoats round her to Park Crescent and so have communicated the complaint.

8153. You think that if you have a flooding in one house and in consequence a fever created the fever may be communicated from that house to the rest of the town?—Yes; isolate or localize the cases and you would arrest the disease. The omission to do this has, I think, been a mistake with regard to the ailment of the cattle plague. If they had localized it, the disease would not have spread.

8154. Have you any suggestion to make as to improvement in the sanitary arrangements of Worthing?—Yes; come what may, the flooding of the town ought to be prevented. That of course I would leave to the practical experience of the local board. Perhaps an iron pipe carried out to low-water mark at Lancing would answer the purpose. Then I think there ought to be a constant supply of water. People say that they can get no water at nights; the Local Board say that the water would be wasted.

8155. Have you paid any atention to the meadows that have been irrigated?—Yes. I have been there.

8156. Do you think that any evil arises from those meadows?—Most assuredly not. No doubt sewage water is poison, but if carried a sufficient distance from the town, it can have no injurious influence. It is not as though it went into a well, where the sun never got to it, but this sewage goes upon the open surface of the ground, where there is free ventilation, and where the sun reaches it; it is not near enough to the town to do any injury at present, but if the town should increase in size, and its confines were close to the 40 acres, then I think that it would be high time that the irrigation works should be removed further off. The proper place for sewage water is no doubt land; for land exercises not only a deodorizing but a purifying influence. I feel convinced that the sewage irrigation has had nothing to do with the illness which has prevailed in the town.

8157. You have stated that you remember a good deal of fever existing in the town when there were cesspools for the houses?—Yes.

8158. Was the fever which existed then of a similar type to that which you have seen this last autumn?—So far as I could observe, the disease which prevailed in November last was, as a rule, much milder in its type, when the patients were delicate it sometimes became typhoid, but in the great majority of cases there was simply sickness and diarrhœa, which passed off in a few days.

8159. Do you agree with Dr. Carpenter, of Croydon, who says: "This last summer we had "measles; we had hooping cough and we had croup; "but not so many cases as formerly, and all the cases, "since our improvements, have put on a milder type "and are more amenable to treatment; we do not "lose so many patients"?—I have no doubt that in proportion, as you improve the sanitary condition of any town, the diseases will assume a milder form. Where there has been simply sickness and diarrhœa the poison does not seem to be sufficiently concentrated to cause infection; but where it has assumed anything like the typhoid type, then it is undoubtedly infectious.

8160. (*Mr. Harrison.*) We have gathered from the evidence to-day that the health of the town in general has very decidedly improved since the sewerage works in the town were carried out?—Undoubtedly.

8161. And that no illness has occurred in the houses and the cottages close to the spot where the sewage is applied?—Yes.

8162. Can you state whether any material effect is produced upon the health of the persons living in the houses near to the sewage works?—I have had no opportunity of judging from any knowledge of the people living in the immediate neighbourhood; but I know of no spot less inhabited than that is at present. As to the town itself, I have no hesitation in saying that the distance is too far from the sewage works to produce any pernicious effect upon the health of the inhabitants.

8163–4. You have not met with any sickness that you could in any degree attribute to the application of the sewage to the land?—Certainly not.

The witness withdrew.

Adjourned till Thursday, January 18, 1866.

Croydon, Thursday, 18th January 1866.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., in the Chair.

John Thornhill Harrison, Esq. | Professor John Thomas Way.

Dr. Alfred Carpenter (of Croydon) examined.

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8165. (*Chairman.*) The Commissioners have had no communication with you previously relative to this inquiry?—No.

8166. Did you practise in Croydon previously to the construction of the sewerage works?—No; I came here just after their first construction in 1852.

8167. Do you remember the outbreak of fever that took place in Croydon about that time?—Yes.

8168. Is it a fact that that fever prevailed in some of the best houses in the highest parts of the town?—Yes.

8169. Did it prevail in houses connected with your sewers as well as in houses not so connected?—It prevailed in both classes of houses.

8170. Was it a type of disease that when once set up was capable of being conveyed by contagion?—That is a doubtful point. I think that, except under very concentrated circumstances, it was not infectious.

8171. Were remarks made at that time as to the main sewers not being sufficiently ventilated?—Yes, it was my impression that that was one of the causes of the fever.

8172. I believe that great improvements have taken place since then in the main sewerage?—Yes.

8173. Have you had for several years successively a very low death-rate?—Yes, a very favorable state of public health.

8174. Do you remember the average death rate that you have had in any particular years?—It has been as low as 16 per 1,000, and it has been generally under 20 in 1,000, after making allowance for increase of

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population. The population has increased from 20,000 to nearly 43,000.

8175. What had been the death rates before the operations of the board commenced?—In one or two years before the works were in progress the death rate was 28 and 27, but I will furnish the Commissioners with correct tables.

8176. Having paid special attention to the sanitary improvement of Croydon, I suppose you will allow that sewerage and drainage and water supply, however perfectly devised and carried out, form only items in the arrangements necessary to secure the greatest amount of health?—Yes.

8177. I suppose you hold that you might have sufficient house accommodation and house ventilation, but to attain the highest results you must have a moral, well-fed, and sober population?—Yes, decidedly. Attention to sewerage alone will not secure perfect immunity from preventable disease.

8178. Therefore, in advocating sanitary measures, a sanitarian is not supposed to profess to undertake to banish entirely every type of disease known to arise from bad arrangements?—No.

8179. Did you pay any attention to the first attempts made to disinfect the sewage?—I did.

8180. So far as visiting and inspecting the works?—Yes.

8181. Did you consider them successful?—No; unsuccessful.

8182. Do you remember whose system it was that was tried?—Several methods were tried, but they generally failed. I have now before me a table giving the annual per-centage of death-rates, as follows:—

In 1848	- - 28	in 1,000
1849	- - 26	,,
1850	- - 19	,,
1851	- - 19	,,
1852	- - 22	,,
1853	- - 26	,,
1854 (cholera year)	26	,,
1855	- - 19	,,
1856	- - 18	,,
1857	- - 16	,,
1858	- - 19	,,
1859	- - 19	,,
1860	- - 16	,,
1861	- - 18	,,
1862	- - 18	,,
1863	- - 20	,,
1864	- - 20	,,
1865	- - 22	,,

8183. When did the works commence?—In 1851. A portion was completed in 1853-4; when the death-rate was near its highest point, they were then approaching completion. I think this table (*handing in the same*) will show the rise and fall of the death-rate for a succession of years.

8184. Have you paid attention to the present mode of irrigation?—Yes.

8185. Are you able to draw any conclusion as to whether the mode of irrigation has any injurious influence upon the health of the district?—I have formed a very decided opinion. For some two years I was uncertain. I felt that it was an experiment, but I thought it would be right to watch to see whether any nuisance arose from the irrigated fields to the injury of the neighbourhood. I have watched, and I can say most decidedly that no injury has arisen to the neighbourhood in any way so far as it has come to my own knowledge although I have tried to find contrary evidence.

8186. Neither to the persons working on the farm nor to the residents in the neighbourhood within the influence of it?—No.

8187. You would, I suppose, infer that fresh sewage may be applied to land elsewhere under similar conditions without fear of injury to the public health?—Undoubtedly, if applied in a proper manner it is not injurious to the public health.

8188. I used the terms "fresh sewage" advisedly; fresh sewage is used daily, I understand?—Yes.

8189. Has your attention been drawn to the condition of sewage that is not fresh and has been allowed to become putrid?—I have had my attention drawn to that, not to house sewage so much as to farm sewage. I should get rid of the sewage as quick as I could.

8190. Did you notice whether there was any smell from the meadows irrigated last summer during the very hot weather?—Yes. I passed over them several times; just before rain there certainly was a slight smell there, but otherwise I did not detect any smell whatever.

8191. Have the persons resident in the neighbourhood made any complaints?—I believe not at all, at least not to my knowledge. I know, as to those with whom I come into contact, that they have never made a complaint to me.

8192. In what state has the public health been for the last nine months in Croydon?—Generally, in Croydon, in the early and middle part of the year, and up to the middle of October I may say that it was very good, during the dry weather. Since October it has not been so good.

8193. What type of disease has prevailed since October?—Remittent fever, more particularly amongst children; and there have been some isolated cases of typhoid fever.

8194. Is that type of disease materially influenced by foul air?—Undoubtedly.

8195. Do you infer from that that there is something in the district that might be removed by additional means of ventilation?—When those cases arose in the first instance they rather surprised me, and I took some trouble to inquire into the matter. I wrote a circular to all the medical gentlemen in the town to ask them for information as to the cases which had come before them, and the majority kindly gave me that information. I found that up to a certain date there had been 22 fatal cases of fever, and that, curiously enough, those 22 cases all dated from one of two particular dates, namely, from the 17th or 18th of October and the 15th of November; each of those two dates was coincident with an immense rainfall. On the 17th and 18th of October there was an inch and a half of rainfall in 24 hours, and the first fatal cases of fever that occurred dated from that time.

8196. I will just suppose a case; that in the dry weather which you had previously, there may have been left a sediment in your sewers and drains and that this sediment became partially putrid?—Yes.

8197. Then a great flush of rain coming down would disturb that—would fill the sewers, and force out any gases which they might contain; and if the houses had direct communication with the sewers without sufficient ventilation, it is possible that the gases may have passed into the houses?—Yes; I have thought it my duty to inquire into the cause of every case of typhoid fever which has come under my notice, and I can state distinctly that in every case, without exception, there has been bad housework in some shape or way; some want of ventilation, or some means by which foul air has got into the house instead of outside, or a stoppage in the sewer. The local board have been wide awake to the necessity for ventilation, and have erected in many places ventilating shafts. As to the public sewers, I believe they are moderately well laid. We have a system of flushing the public sewers, and they are flushed regularly every week. In Croydon many of the houses are not in rows, but are detached, with long branches and private drain works. These private branch works are not flushed during dry weather; there is a continual filling up going on in them. I am certain that that was the case before the rainfall came in October. The putrid stuff in the sewers was gradually washed away, and, unfortunately, the lower sewers in the town were flooded with a very large quantity of water from the rain. The consequence was that the gases could not escape by the main sewer, and instead escaped by the branches that were unventilated, and so got into the houses. I find with

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regret that many of the principal houses in Croydon have a fault of serious consequence. The rain-water pipes have been made to be ventilators, and during heavy rainfall are occupied in another duty. The rain going down the pipes prevented the easy ascent of the gas. Most of these houses have got cisterns, with overflow pipes leading into the sewer. Now during a hot summer traps and syphons may get dry and there may be no water in the syphons (as I have found by examination in many of the houses) and the pipes are untrapped; the result is that there is less difficulty for the foul gas to ascend through the cistern or bath overflow pipe than up the rainwater pipe, so the gas is forced into the house, and people are sleeping in an atmosphere of foul gas instead of pure air. I can trace in several of our best houses in Croydon that such has been the case, and there have been several in which I have seen a fatal case, but the people of the house declared that there was no smell; that they had not perceived any smell, and they could not think that there could be any escape of foul gas; in one instance the lady said that she recollected a smell on several occasions when greenwater was thrown down the back kitchen sink, and that the smell was perceived, not in the rooms downstairs, but upstairs. It came from the watercloset. The remedy for that had been to stop the discharge of the greenwater down the sink, but there had been no thought of seeing that the upper portions were properly trapped. In that house the overflow of the cistern was untrapped, which was only perceived from the greenwater going down whenever there was a fall of rain. She Local Board have determined that this defective arrangement shall be remedied in future. An idea has been broached to me by persons not resident here that these cases of fever, may have arisen from the irrigation works. But the proof that they did not so arise is, I think, in the circumstance I have first mentioned, that in every case, so far as my knowledge extends, there has been a local defect, and secondly, that during the continuance of these cases, the winds have been either south or south-west, whilst the irrigation works lie west and north-west of us; and during the time when we have a north-west wind I can say most distinctly that the health of the neighbourhood has improved, and this will be confirmed by others. With regard to house ventilation I have submitted some resolutions to the Local Board, and the surveyor will tell you that he has been instructed to see that they are carried out, and that for the future no building will be allowed to be inhabited that is not properly ventilated.

8198. (*Mr. Harrison.*) Did the cases of fever of which you have spoken as having occurred last autumn occur in houses of the better class? — In some low small houses, but in some of the best houses as well and especially in the highest part of the town.

8199. Are the waterclosets in the better class of houses generally within the house?—Yes.

8200. Is that the case with the cottages in the town?—I think not to any extent.

8201. Has there been fever in the cottages in the town as well as in the better houses?—I question whether there has been much fever in any of the old houses in the town at all. The cases have generally been in the new houses, according to my experience; in those that were built between 1854 and 1860. I cannot speak from professional experience as to the cottages.

8202. You stated that the lower parts of the sewers had been filled with water during a storm?—Yes.

8203. What would be the effect of a quantity of water rushing down a sewer upon the remaining outlets, the waterclosets in the houses?—I can tell you from personal experience. I have a ventilator in my own house, and on the night of the 17th of October by mistake it had been made to act as an overflow for the cistern at the top of the house. During the storm of the 18th of October I was awoke in the night by a rushing sound in the watercloset, a sound that I could not understand. I believed that a pipe had burst. I got a light. I found no water escaping, but I found the air coming up and bubbling through in quantities; coming with a regular rush through the trap of the watercloset, and this went on during the three wet days. That arose from an oversight on the part of the plumber. I did not order the windows to be kept all open, there was not any great smell, scarcely any, except a faint odour. But two days after that my nursemaid fell ill with typhoid fever, and 10 days after that my child that had been poorly during the same time the two occupied the one room into which the foul air from that watercloset would be conveyed in the night time. The same thing which happened in my house to a large extent happened to a small extent in very many houses similarly circumstanced.

8204. The watercloset became the means of ventilating the sewers for the time being?—Yes.

8205. That shows the importance of having a very complete system of ventilation to the sewers outside of the houses?—Yes.

8206. Which can act thoroughly in the case of a storm?—Yes; that can act independently of the rainfall at any rate.

8207. (*Chairman.*) I believe there are certain gases which are capable of generating disease, and which do not indicate themselves by smell?—Yes; the miasmata which produce fevers are not necessarily perceived by the smell.

8208. A stinking gas is not necessarily the most injurious?—No, and it is the safest for that reason. Medical students find this out in connexion with dissection. A cut in the finger may be serious to a person dissecting a fresh body, but after putrefaction has been set up, and the smell from the body is of an excessively offensive character, a person dissecting is not nearly so likely to take injury from a cut. Making a *post-mortem* examination is a more dangerous duty than dissecting a very putrid body.

8209. (*Professor Way.*) The quantity of these gases may be infinitesimally small and yet produce disease?—Yes.

8210. But that we know nothing about?—No; I believe that the stinking gases act more as carriers of the poison that produces fever.

8211. For instance, ammonia is a great carrier, but is not injurious in itself?—Hydro-sulphate of ammonia is probably the carrier of the poison that produces typhoid fever. You get a fever poison without a gas occasionally, and then you run more danger than if the stink was thoroughly developed.

8212. (*Chairman.*) What is the gas given out from the lime purifier in a gas house?—Hydro-sulphate of ammonia.

8213. Are you aware that it is quite common for mothers to take their children suffering from whooping-cough and croup into a purifying house?—Yes; but not for the sake of the ammonia. I suspect that the tar also has something to do with it. Some tar products are beneficial in whooping-cough. Hydro-sulphate of ammonia itself is a deadly poison, and patients should not be exposed to its influence for any length of time.

8214. During the healthy years at Croydon did you notice that the diseases were usually of a milder character than you had known them before?—Certainly, and more manageable.

8215. There were children's diseases — croup, measles, scarlatina—but you found them more amenable to treatment?—Among the middle and higher classes they were seldom attended with fatal result; where all the appliances of wealth existed fatal results were almost unknown.

8216. Would you not say that one great safeguard may be obtained by abundance of proper ventilation?—Undoubtedly. No house can be safely connected with a general system of sewers unless a measure of ventilation is provided for that individual house.

8217. Is it not specially necessary to see that the means of carrying away slops are not turned into

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a means of conducting foul gases back into the house?—That is undoubtedly necessary. The tendency of the present age is to make everything comfortable and easy. The putting of slop tubs upstairs to save the housemaid the trouble of carrying them down has been a source of considerable danger, and in every case that I have known of this practice I have persuaded the parties to cut off all communication with the sewer. The evidence that I have given has special reference to the town of Croydon and Beddington Farm. With regard to the irrigation works at Norwood, in their first origin they were not perfectly successful; but my impression has been from observation that they have not been injurious to the health of the neighbourhood. I cannot speak with any very great amount of experience, but observations addressed to me upon the subject have led me to make some inquiries, and I do not consider that any great amount of damage has accrued from those works. I am satisfied from examination that no damage will accrue from them. The local arrangements as to some of the houses at South Norwood are as bad as those I have represented in Croydon.

8218. (*Mr. Harrison.*) I observe in a return that the deaths at Croydon in 1863 and 1864 were in excess of the previous year, but upon referring to the Registrar-General's return that seems to be accounted for by the excessive sickness prevailing throughout the country?—The Registrar-General's return does not apply to the parish of Croydon alone. Croydon alone probably contains over 43,000, but that return includes Mitcham and Penge (which is increasing in a most rapid manner, more so than Croydon), and altogether I think 11 parishes. That return therefore can be no guide as to the mortality of Croydon proper. This however I may say, that our average has always been below the general average of the country. There is an impression abroad, which has arisen from the isolated cases of fever terminating fatally, that Croydon is an unhealthy place. I think we may give the most emphatic denial to that assertion. It has been rumoured that I have stated that Croydon has been in a very unhealthy condition owing to the irrigation works. I wish to give that the most emphatic denial as regards Croydon generally. My impression is that we are now in an average healthy state, and the cases that I alluded to were due to a definite local cause in the houses themselves, and had nothing to do with the locality generally.

(*Dr. Sutherland.*) I have always understood Dr. Carpenter to have stated so. I may mention that I happened to have 12 of the medical men of Croydon at my house last night, and this matter was talked over, and they all stated that the cases of fever that were now occurring were comparatively few, and that within the last 10 days they had scarcely had any fresh cases at all.

8219. (*Professor Way.*) Supposing that the sewage was at this moment running into the Wandle, would you propose that it should be put upon these meadows?—Certainly. I do not think there is any connexion whatever between the disease that has been existing and the irrigation of those meadows; not the slightest trace of connexion.

(*Dr. Carpenter.*) Undoubtedly not, we have most conclusive proof of that.

(*Dr. Sutherland.*) The sewage irrigation has been the measure of the greatest benefit to Croydon that has ever been adopted.

The witness withdrew.

Dr. W. Sutherland.

Dr. William Sutherland (of Croydon) examined.

8220. (*Chairman.*) Have you heard the evidence given by Dr. Carpenter?—I have.

8221. How long have you been resident in Croydon?—I have been practising there for upwards of 30 years.

8222. Is there any part of the evidence given by Dr. Carpenter with which you do not agree?—I think not.

8223. Can you corroborate or strengthen any part of it?—I wish to speak very particularly in regard to our previous epidemic, that which broke out immediately after our works had been constructed. I had a very strong conviction at the time, and it has been strengthened by all my experience since that,—that epidemic was chiefly ascribable to want of ventilation in our sewers. I gave evidence to that effect when Dr. Arnott and Mr. Page were here. In High Street there was scarcely a single house which escaped from that fever, while in the recent epidemic, I believe there has been less fever in High Street than in any part of the town, so far as my experience has gone. I can corroborate very strongly the evidence given by Dr. Carpenter, as to the fact that the fever has been more prevalent in the new districts than in the older parts of the town. I cannot very well account for that, except that the surface drainage of our roads has been less attended to in the new districts than in the older parts of the town, and that the water has been allowed to remain longer upon the roads. As far as my experience goes, the cases of fever last autumn that were traceable to sewage works or drainage were very few indeed. In our first epidemic almost every case was of the true typhoid character; such cases within the last three months have been in my practice exceptional; the generality of cases have been simple continued fever. It ought to be known that when we first started our system of sewerage there was no means of ventilating our sewers, and consequently during the first epidemic we found servants chiefly attacked, and then children; the fathers were very seldom attacked at all because they were not much at home, while the others were mostly at home. The only way in which the gases could escape was into the houses, either through the sinks or through the waterclosets. Since I have been a member of the Croydon board there are two points that I have repeatedly brought before it and insisted upon as the great essentials—first that we should have a complete ventilation of the sewers, and secondly that flushing ought to be carried on regularly and systematically.

8224. (*Mr. Harrison.*) I gather from your evidence that the first outbreak of fever was occasioned by want of ventilation and that ventilation, though it has since to a certain extent been improved, is not so perfect even now as to prevent our attributing the recent outbreak of fever to the same cause?—No, not entirely so; I do not attribute the late outbreak of fever to our sewers in any way; some quite exceptional cases may have been connected with them, but the fever generally has, I think, been more from atmospheric causes, chiefly wet and mild weather. In our former epidemic I attributed almost every case to defective ventilation, and I have always recommended to the board that in cottages more especially there should be no direct communication between the interior of the house and the common sewers. You are aware that in small cottages the sink is usually in the apartment where the family live, and I have always recommended that the communication with the common sewer should be external to the house, with a syphon trap and a grating over it for the escape of the foul air.

8225. Have you attended professionally any persons resident in the neighbourhood of South Norwood during the operation of irrigation?—Yes. I have to attend several families living there, in Albert Road, Harrington Road, and the district immediately adjoining.

8226. Have you paid attention to those irrigation works?—Yes.

8227. How long have they been in operation?—14 months.

8228. Have you noticed the operation going on?—Yes.

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8229. Do you know the property which has been spoken about ?—Yes, very well. Mr. Lowe's property is in Albert Road, between that and Harrington Road.

8230. Have you paid sufficient attention to the subject to be able to say whether the irrigation of those meadows causes disease ?—I have no reason to believe so.

8231. Has it come to your knowledge that there is any defective arrangement in the house drainage and the waterclosets in any of those houses ?—Yes, there is no doubt about that I believe. As to Norwood, one of the great evils of that district is the limited supply of water which they have ; they are supplied by the Lambeth Waterworks Company upon the intermittent system, and they have a supply once a day, formerly it was not more than once in two and sometimes in three days. I believe that there is not a sufficient quantity of water to flush the sewers.

8232. (*Chairman.*) Did you hear Dr. Carpenter's graphic description of the overflow pipes being liable to drive the gas back and carry it to the water ?—Yes.

8233. If a foul gas is brought into contact with water it is condensed and absorbed ?—Yes.

8234. Just as gas is absorbed or retained in a soda water bottle ?—Yes, in a smaller degree.

8235. Gases that would be injurious to health may be absorbed and taken into water ?—Yes, I may mention, as to the irrigation works, that I had a case of fever in a servant living in a family in Whitehorse Road ; she had fever of the usual type, and she was removed to a house at Norwood, perhaps the nearest house to the irrigation fields. Instead of the case being aggravated by removal to that place, I had no case under treatment that went on more satisfactorily. I should have expected, if there had been poisonous air there, that it would have affected this patient to some extent.

8236. (*Professor Way.*) Would it have retarded her recovery ?—I should have supposed so.

8237. (*Chairman.*) Have there been cases of fever of a similar type amongst persons employed upon the irrigation works ?—I never heard of any.

8238. Or in any of the houses bordering the land ?—I never heard of any.

8239. (*Professor Way.*) What is the nature of the houses in the neighbourhood of Beddington ?—There are not many houses very near the Beddington property.

8240. (*Mr. Harrison.*) Before the sewerage works were carried out, could you trace any cases of sickness distinctly to the water that was drunk in the town being affected by cesspools ?—That is an exceedingly important question. I did know of many cases of diarrhœa which were caused directly by the poisoning of the wells by sewage from privies (which were then common in the parish) percolating through the gravel into the wells. I have seen drinking water in wells often rendered turbid by sewage matter and found it smelling most abominably.

8241. Have you any cases of a similar character now ?—Never.

8242. Is it not the fact that sewage water, from which all solid matter has been separated, has been found on analysis to contain a considerable amount of ammonia, but that sewage water discharged after irrigation contains very little ammonia, but a large quantity of nitric acid ?—Yes.

8243. Do you consider that when the water is freed from the solid matter and passes off the land containing nutric acid instead of ammonia, the danger is considerably diminished ?—I think there cannot be a doubt of it.

8244. (*Professor Way.*) Before the construction of the irrigation works what was the general state of public health in Eldon Park?—I believe very good ; I am not aware that there has been any particular difference. I attend a certain number of families there, and I have not noticed any change either before or after the construction of the works. I have not known any circumstance to lead me to believe that pisease arose from those irrigation works.

8245. You have not noticed any increase of disease either from that or any other cause ?—Not any disease that I could trace to the irrigation works.

8246. Do you know whether any medical men in the neighbourhood consider that disease has been increased by those works ?—I have not had an opportunity of conversing with any of them on the subject. The favourable recovery in the case of fever to which I have referred took place I believe in the house nearest to the irrigation works.

The witness withdrew.

C. W. Johnson, Esq.

CUTHBERT WM. JOHNSON, Esq. (of Croydon), examined.

8247. (*Professor Way.*) You are a barrister-at-law ?—Yes.

8248. And chairman of the local board of health of Croydon ?—Yes.

8249. For how many years have you been chairman of the board ?—I was chairman for four years, dating from the time when the board first came into existence ; and I have been chairman for the last two years.

8250. You are therefore conversant with all that has been done with regard to sanitary arrangements ?—I am.

8251. Can you give us a short account of the sewerage works of Croydon ?— Yes. When the present system of sewerage was first adopted the original plan was to send the whole of the sewage of the town direct into the Wandle through two porcelain sewers, discharging themselves just above Waddon Mill. We did not entirely regard that as a final measure, because from the first I contemplated the eventual utilization of the sewage of Croydon for the purposes of irrigation. I had been carrying on some small experiments for years, and from the result of those experiments I was always willing to recommend to our board to employ it for irrigation purposes. However, there was some difficulty in getting land, especially above Waddon Mill, and we were reluctant to seek for it below Waddon Mill for fear that we should take away water from that mill. We were looking about for land, and just then I left the board. After that a filter house was erected and several schemes of deodorization were tried, some of which I cannot recollect.

8252. The place was leased I believe to several persons in succession ?—Yes, and the plans were all mistakes, they made matters worse.

8253. Was lime tried ?—Yes, and charcoal, and all sorts of things, all of which made the sewage as little changed as before.

8254. I recollect that choride of iron was tried ?—Yes.

8255. And carbolic acid ?—Yes.

8256. Do you know the cause of the failure of those experiments ?—The failure was that they still left the sewage in so impure a state that the people on the river objected to the sewage being discharged into the river.

8257. It was found that you could not purify the the sewage in that way ?—The thing did not work.

8258. Was much expense incurred ?—Considerable expense. I cannot say how much.

8259. 300*l.* or 400*l.* a year ?— More than that. Finally the board came to what I take to be the only plan for the purification and disposal of the sewage of towns, and that is irrigation.

8260. Do you think that all other means had been exhausted ?—Yes. The result was we took 250 acres of land down at Beddington, and carried on to that land the whole of the sewage of the town. That was an operation that ought to have been performed some time before it was, and from that time to this there

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has been no complaint of the water; and I take it, the process, considering the large scale upon which it is necessarily carried on, is as perfect as possible.

8261. Your last successful attempt to purify the sewage was made under the threat of chancery proceedings?—Yes.

8262. Since you have had a fair opportunity of applying your remedy, have you been at all involved in litigation?—No.

8263. When was the last complaint brought against you?—I am reminded of the case of Mr. Bidder, whose house is down the river, and who has a very valuable fishery; he complained that we had killed his fish. I had reason to believe that it was not owing to any matters that passed off our irrigation field proper, but that it was owing to something that had been poured into the sewage by the gas company who had been cleansing some of their works, and it was the ammonia or the tar, which I have no doubt was injurious to the trout.

8264. Were there not several of the proprietors on the Wandle who combined to attack you?—Yes.

8265. Are they satisfied now?—I believe so, perfectly.

8266. Have they expressed that in any way?—I can give you an instance: Mr. Gurney, who is an excellent man, lives below our irrigation grounds; he was rather afraid at one time that the water, after it had passed over our fields, would be obnoxious, and he therefore compelled us to divert the water a little further away from him to avoid one of his mills. Since then the fish have all returned into the stream, and he has lately expressed a wish to have the water returned to his mill, and he has had this done by constructing a culvert at his own expense, at a cost of 300*l.*; he uses the water for his mill and it also passes through his grounds.

8267. Has the miller at Waddon mill complained of the state of the river since your irrigation works were established?—He has only complained that he has not enough water now. After we had gone through a very expensive law suit, which we carried to the House of Lords, it was decided that we had a right (and this was never claimed by our board) to do what we liked with the sewage. We now go below his mill.

8268. Have any complaints been made from other mills?—Only of the extent to which the water is taken from them.

8269. Were there continual complaints made before, when you used to discharge the sewage untouched, except by process of precipitation?—Yes.

8270. You had been involved in law suits pretty nearly from the commencement of your works to the time when the irrigation works were established?—Yes, and since then they have ceased.

8271. (*Chairman.*) You leased the land to which the sewage is applied?—Yes.

8272. How much of the term of that lease is unexpired?—About seven years are unexpired now.

8273. In the event of your not being able to renew that lease upon favourable terms, what will you do?—We contemplate that almost in any event we shall pump the sewage and carry it far away from Croydon where we can get land at its agricultural value. The Commissioners must understand that one great difficulty we have to contend with is the great value of land in our neighbourhood. In the town of Croydon it ranges from 1000*l.* to 2000*l.* an acre. We are paying for the land at Beddington 5*l.* an acre rent, and we have every reason to think that the landlord, when the lease is out, will want a higher rent for it as it may be available for building ground and railway stations.

8274. Do you know what the value of that land originally was?—We were informed that the land went begging at about 2*l.* an acre, but when the owner knew that we wanted it, the price rose directly.

8275. (*Professor Way.*) Cheap land at a distance requiring greater extent of pipes would be cheaper than dear land close to the lines?—A great deal. We calculate that we could get 300 or 400 acres of land at a certain distance at about 25*s.* or 30*s.* an acre; it would be to the advantage of this town to buy it and pump the sewage.

8276. Before the passing of Lord Robert Montagu's Act I believe you had not power to take other persons' land except by consent?—I think our Act empowers us to go through any land.

8277. (*Chairman.*) It is the fact, is it not, that Croydon has largely increased in population since the local board was established?—Yes, and it is going on faster and faster.

8278. Has there been any relative increase in the value of land in the vicinity of Croydon for building purposes?—Yes, very great indeed.

8279. Do you recollect from what price it has risen?—It has been gradually on the increase. Land which in the memory of persons in this place was not worth 250*l.* an acre is now worth 1,000*l.*

8280. As chairman of the local board, can you reasonably infer that your sanitary operations have had a moderate share in adding to the value of land and in offering temptations to increased building?—Decidedly.

8281. Do you think that the rated inhabitants, owners of land and houses, have had their equivalent in value by the construction of these works?—Most decidedly.

8282. Whatever you have expended has in your opinion added to the value of property in the district?—Yes.

8283. Not taking into account any question of whether or not there has been an increased saving of human life?—Yes. I should mention that in the last year, 1865, there were 1,200 new houses built in our parish, and that would represent, at 5 and a decimal per house, about 6,000 people. That is an indication that Croydon is not held in bad estimation as regards its sanitary arrangements. You will hear on all hands that our water supply is so superb and so cheap.

8284. What is the rate you charge your private consumers for water?—There is no regular progressive rate of charge. The great object of our board when we fixed the water rate was to have the service for poor people as low as possible.

8285. Can any poor person in Croydon have a supply of water at a cost which he can afford to pay?—For 4*s.* 4*d.* a year.

8286. 1*s.* 1*d.* per quarter?—Yes.

8287. Or a penny a week?—Yes.

8288. Is that the present rate?—Yes. I may add that if the landlord pays the rate, which he often does as an inducement we take off 33 per cent. out of the 4*s.* 4*d.*

8289. For that price is the supply continuous?—It is up to 11 o'clock at night.

8290. In fact, a cottager at Croydon has for 4*s.* 4*d.* a year a supply of water better in quality and not less abundant for his purposes than a person in London will have for 8*l.* or 10*l.*?—Yes, he is unlimited in supply.

8291. You have had a pretty intimate acquaintance, I dare say, although a very troublesome one, with the progress of sanitary works at Croydon?—Yes.

8292. You are acquainted with what was called the battle of pipes versus brick sewers?—Yes.

8293. What difficulties have you experienced with regard to your sewerage system?—We could not if we began again do anything very widely different from what we have done, except in one or two respects; we might have made some of the main sewers a little larger, and also we should earlier have gone into the system of irrigation. We ought not to have wasted money and time in attempts at deodorization which were all failures.

8294. With regard to water supply, have you gained any experience that would enable you to avoid any useless expenditure?—I think not. The supply has worked very satisfactorily from the commencement.

8295. You have had at some periods of your existence as a board, if I remember rightly, enormous wastes in the distribution of the water?—Yes.

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8296. Did you take any special means to inquire into the amount of that waste, and then did you take some special means to prevent it?—We did. We were never able to trace much loss to leakage of the main or of the reservoir, but we attributed the waste to the reckless way in which the water was used, and to the practice of leaving the taps unturned down. We appointed an officer called inspector of taps to go round from house to house, and always to keep moving round the parish. The result was that there was an immediate and very considerable diminution of consumption to the extent, I think, of about 200,000 gallons a day, and we have since noticed that if ever the inspector has been taken off for awhile then the waste has recommenced.

8297. In your case, where pumping is resorted to for the whole supply, every 1,000 gallons wasted would represent also waste of coal and engine-power?—Yes.

8298. Does not the inspection which you have so established effect a much greater saving than the cost of the wages of the inspector?—There is no doubt that a very great saving is effected.

8299. From the experience which you have gained of the irrigated meadows, is there anything that you would alter there if you had an opportunity?—I think not.

8300. I believe the process is to take out the coarser part of the sewage in some settling tanks?—Yes, there are two settling tanks.

8301. And then to pass the sewage water immediately on to the land?—Yes.

8302. I understand that you can pass it over once or twice over the land, and in some cases as many as three times?—Exactly so.

8303. You catch the sewage by intercepting drains and so distribute it on to the land?—Yes.

8304. Do you consider that the process is, agriculturally speaking, successful?—Decidedly.

8305. Is the grass produced wholesome food for cattle?—I believe so. I hear from my friends that they regard it as very capital food.

8306. A charge has been brought against it in some places, that it scours cattle, and that milk obtained from cows fed upon it is not so wholesome. Have you heard that?—No, nor do I believe it to be the fact.

8307. Have you heard in your capacity of Chairman of the local board that disease has been attributed to the irrigation of the meadows?—No.

8308. Have you heard what has been said in this room about South Norwood?—Yes.

8309. Are you aware of the irrigation there having caused disease?—I think not.

8310. Has the subject come before your board?—I do not remember it.

8311. (*Mr. Harrison.*) Has your board gone into the question of the height to which they would be prepared to pump the sewage?—We have not gone into any particular account, but I take it that we should pump to any height that would carry the sewage over our adjacent hills, and I should say that the most probable direction is the Branstead country where there is a rise of perhaps 150 feet.

8312. Your board would be prepared to pump it even that height in case of necessity?—Decidedly; the engineer and I have had many consultations about it, and we seriously contemplate that that will be our fate.

8313. In the case of towns upon the river Thames, where there would be no necessity to pump more than 20 feet at the utmost, do you think that such pumping should form any obstacle in the way of their utilizing their sewage upon the land?—Most decidedly not; my own feeling is that all towns ought to lean to the pumping system, and for this reason: when you get out of a valley you get into poorer land; the rental gets lower and lower the higher you get, and the difference to us on 400 acres of land of paying 30*s.* and paying 5*l.* would be very great; the expense of pumping would be nothing equal to the difference.

8314. (*Professor Way.*) Application of the sewage to poorer land makes a greater difference than to richer land?—Exactly; there is another advantage, that as you get further from towns, manure becomes more valuable, and the whole system is more valuable. Immediately round a town like Croydon there is an abundant supply of manure, but that is not the case further off.

8315. Where a town is enlarging its boundaries, and where there is very good reason to anticipate that it will grow, would it not be better to commence pumping at once rather than lay down works, which afterwards may have to be abandoned?—Certainly.

8316. Do your settling tanks stop the solid matter of the sewage, or the greater part of it?—Yes.

8317. Any solid masses?—Yes.

8318. Is it not the fact that a very large part of the solid matter of the sewage, the undissolved matter, goes away with the sewage in a fibrous highly divided state?—Certainly.

8319. The quantity taken out of those tanks, that is, really sewage matter, and not the debris of the roads, is not very great?—It is pretty considerable in amount, but of very little value.

8320. You do not filter the sewage?—No, we only take roughly the mechanically suspended matter; it is worth only about 1*s.* 6*d.* a load.

8321. You do not separate the solid from the liquid?—No.

8322. From your knowledge of this matter do you think there would be any hardship in obliging towns generally to keep their sewage out of rivers?—I should say they ought fairly to be compelled to keep the sewage out of the rivers until it has been over the land. I think that if the authorities of a town were to adopt the system of irrigation, and either take land on a long lease or purchase it, then, provided that they accompany those movements with what I take to be a primary measure in all operations of boards of health, viz., having a water supply in their own hands for the whole town then, from my experience at Croydon, I contend that the rental from the improved land of the town, the profit from the irrigated meadows, and the revenue from the water rates, however low, will be quite sufficient to pay the interest of all the borrowed money necessary to carry out all the improvements.

8323. Are you acquainted with the works at South Norwood?—Yes, I have been there several times.

8324. Do you know them sufficiently to be able to form an opinion as to whether they are being carried on so as to do no injury to the district?—I think so; but you must understand that Norwood is in a transitional state; it is unfortunately on the London clay, and many difficulties continually arise there. The locality being very attractive, many houses have been hastily built there. Frequently one's experience is that whole rows of houses are built and streets laid out without any consideration of how they are to be drained; the roads have a clay bottom and get into a most horrid state; then the houses get tenants, who find the road to be very bad, and the only drainage to be into cesspools; and the builders find, for the first time, that the London basin clay is retentive of moisture, and that sewage does not soak away sufficiently on a rainy day. In this state of things they came to the Local Board to know what was to be done. We are now employed upon a very comprehensive system of drainage; we are laying down sewers, and our great difficulty has been with the water shed to get an outfall. We have provided some 30 acres of land, and the irrigation there is working very nicely, and I have no doubt that when we can carry out another improvement, that is, a better supply of water for Norwood, all these difficulties will be removed. At the present time the water is very limited in quantity as compared with ours, especially to the cottages, and the result is that the sewage from those cottages and those houses is richer than ours. It is only semi-fluid, and there is therefore more difficulty in managing it; but we are doing all that is possible under the circumstances.

The witness withdrew.

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Mr. Baldwin Latham (engineer to the local Board of Health Croydon), examined.

8325. (*Chairman.*) How long have you been engineer to the Local Board of Health?—Over two years.

8326. Had you had any experience in sanitary works previously?—I was assistant engineer to the Nantwich Local Board for four or five years, and I was at Ely for five years.

8327. Anywhere else?—Not as resident engineer; as consulting engineer I have been at a number of places—Bideford, Reigate, Leatherhead, and others.

8328. You are in extensive practice as a sanitary engineer?—Yes.

8329. Have you under your supervision at Croydon sewerage, drainage, water supply, and irrigation?—Yes.

8330. The system of sewerage here was not, I believe, originally laid out by you?—No, it was originally laid out by Mr. Ranger.

8331. And you have extended it from time to time?—Yes. As new districts spring up building begins and population increases very rapidly, between 5,000 and 6,000 every year; consequently, extensions of public works become requisite.

8332. Have you a water supply?—Yes, for our district, which extends within a radius of two miles of this building.

8333. What is your existing pumping power?—When working at moderate speed the two engines are equal to 640-horse power.

8334. What volume do you pump in 24 hours?—It varies from 1,000,000 to 1,500,000 gallons.

8335. What elevation do you pump?—From the surface water to the top water in the tank is 140 feet.

8336. What distance horizontally?—One mile.

8337. Can you give us in a tabular form the number of strokes per minute, the volume of water lifted, and the quantity of coal consumed?—Some two or three years ago, previously to carrying out the new water works here, I collected information which I then tabulated in a report. At that time Croydon is described as using Cornish engines with raising main 12 inches in diameter and 4,000 feet in length, as using Welsh coals, 16½ cwt. of coals being required to raise 1,000,000 gallons 100 feet high; our entire expense is about 1200*l.* per annum, including coals, engineer, turncocks, and repairs.

8338. You raise perhaps 400,000,000 gallons in a year?—Yes, probably more.

8339. And lift it 140 feet?—Yes.

8340. Will you hand in a copy of that table?—Yes.

8341. Have you sunk a new well recently?—Yes, within 46 feet of the old well.

8342. By means of cast-iron cylinders?—Yes. The well is lined with cast-iron cylinders. The upper cylinders are 9 feet in diameter; then follow cylinders 6 feet in diameter. The upper part of the bore is lined with 30 inches in diameter. And the part of the bore thus lined is 3 feet in diameter. The total depth of the well is 150 feet.

8343. Do you continue the 3-feet bore to the bottom?—We continue 2 feet to the bottom.

8344. What volume of water do you anticipate that well will yield you?—We have tested it at the rate of 1,000,000 gallons a day; our pumping power would not raise more; it has not affected the existing well.

8345. You are putting down a new engine above that well, of what power?—A Cornish engine of 120-horse power.

8346. What volume per day will you deliver into your service reservoir?—I originally designed the engine to work 1,800,000 of gallons a day, but the speed would then be very slow; we could increase it at any time to 2,500,000.

8347. Independently of your existing power?—Yes.

8348. You think that your wells are capable of supplying the engines working?—We know that the old well will yield 1,500,000 gallons a day continuously; and as the new well yields 1,000,000 gallons a day without affecting the old well, we may expect a supply of 2,500,000 gallons a day.

8349. (*Professor Way.*) Are both the wells of the same depth?—No, the old well is 75 feet deep only, and the new one is 150 feet.

8350. What stratum do you go through?—Only chalk. I think we shall get much more water by drawing the water of the old well to a much lower water level than at present; if so the 2,500,000 gallons will represent the minimum supply.

8351. (*Chairman.*) Do you know what volume goes down the Wandle in 24 hours opposite Croydon?—No, but I think I have heard that it is something like 7,000,000 of gallons a day.

8352. What is the exact area of ground that you have for the irrigation works at Croydon proper?—Croydon proper is drained to Beddington, and the farm is about 312 acres.

8353. What area have you power to irrigate?—About 260 acres out of 312.

8354. Is Mr. Marriage the lessee of the whole?—Yes, he has the whole entirely in his hands and charge.

8355. What is the volume of sewage that passes out to the land?—It varies considerably from about 2,100,000 to 4,000,000 and odd gallons a day. During the excessive storms we have not been able to gauge, 2,000,000 is the minimum during the last two or three months.

8356. What volume of water supply do you give?—I have carefully ascertained the number of houses that drain to Beddington, and the number is 4,880, containing a population (at the rate of 5·78 persons to each house) of 28,100 inhabitants; and taking the supply at 36 gallons per head, I find that the total quantity of water supply to houses draining to Beddington is very nearly equal to 1,000,000 gallons a day; the difference is accounted for by subsoil drainage and rainfall, they duplicate the quantity which would come into the sewers from the water supply. They quadruple it at times.

8357. What has been the highest rate of supply since you can recollect Croydon that you ever had to pump?—We have had to pump at the rate of 56 gallons per head per day; our average was 46 when I came here.

8358. Would you be surprised to learn that at Worthing, where there is pumping, the supply does not exceed 12 gallons per head per day?—No; I believe that with a perfect system of water works, such a supply may be sufficient; I do not think that in any town the supply ought to exceed 20 gallons with the watercloset system, the supply must vary with the system. In many towns in which the watercloset system is not completely carried out the water supply is small.

8359. In Worthing they have the watercloset system?—Yes, and I think that the system at present in use at Croydon is capable of very great improvement. We are now, in fact, adopting a system that will probably relieve us of a very large amount of pumping.

8360. If you could reduce the waste of water you would in a corresponding degree reduce the annual cost of fuel, tallow, hemp, and all other expenses for pumping power?—Not in exactly the same ratio, but to a very considerable extent.

8361. And your sewage would be richer by that amount of water being abstracted?—Yes, and more manageable. My views of sewage are these, I think that sewage is more beneficial and more easily assimilated by plants when applied in a dilute state than in a concentrated form. Perhaps that is one reason why in wet seasons irrigation lands do better than at any other times.

8362. I assume that your subsoil water has a tendency to dilute the sewage in the town, and also to purify the sewers by carrying off sewage matter passed

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in from houses ?—It certainly dilutes the sewage, but it purifies only the low level line sewers that touch the waterbearing chalk; it does not affect the upper branches.

8363. They would be in a dry subsoil ?—Yes.

8364. Are you able to give an opinion as to whether a sewer is more manageable in a wet subsoil or in a dry subsoil with reference to sewage purposes ?—I should prefer to construct it in a dry subsoil. But the greater quantity of water that you can convey through a sewer the better it is for its working.

8365. If you were about to lay out a system of sewers and you could command two subsoils, one a dry one that would only pass the water that is poured in from the houses, and the other a wet subsoil that would pass double that volume of water; as a sanitary engineer, which subsoil should you prefer ?—The wet one.

8366. That would give you a command over a volume of water that you could pen back at your manholes for the purpose of flushing ?—Yes.

8367. (*Mr. Harrison.*) Besides that the water is always going from without into the sewer ?—Yes.

8368. Whereas if it was a dry subsoil there might be a counter action, and the sewage might pass from the sewer into the subsoil ?—Yes.

8369. (*Chairman.*) Have you any reason to believe that sewage passed upon land injuriously affects the public health ?—Not at all, if the system is properly carried out.

8370. Do you conceive that a system might be carried out that would be injurious to public health ?—Certainly.

8371. Do you think your system is carried out in such a way as not to be injurious to health ?—I think so, speaking now of Beddington.

8372. Are your main sewers as abundantly ventilated as it is desirable they should be ?—I do not think they are, nor anything like it.

8373–4. Could you make improvements by making additional ventilators ?—Certainly, and I have recently applied to the local board to apply to the Secretary of State for powers to borrow money for the purpose of ventilating the public sewers, and enlarging sewers and water mains; the sum required will be 23,000*l*., and I think the board have come to the conclusion that they will expend that sum of money for the purpose.

8375. Do you think it would be advisable to break up the system at certain points ?—Yes, very desirable in the main drainage.

8376. So as to give relief to the upper parts of the system ?—Yes, I think that the prevailing disease has been greater in the upper parts of the town, in the buildings which are removed from the irrigation fields.

8377. Therefore, if that part of the town has been at all affected by sewage gases, they have not arisen from the land but from something connected with the system of sewers ?—Yes.

8378. (*Mr. Harrison.*) What is the area of Croydon that you think may eventually be sewered ?—The area of the parish is nearly 10,000 acres.

8379. What proportion of that is built upon ?—About 1,700 acres of that area drain to Beddington.

8380. My question was, what proportion of that area is built upon ?—A very small proportion, comparatively speaking.

8381. Is the whole of it likely to be built upon eventually ?—Certainly the whole of the parish will be built upon.

8382. Have you made any observations as to the quantity of water discharged from the irrigated land ?—Yes, and I will supply you with the result. I find that the sewage generally takes from three to five hours after leaving the sewers to discharge itself at our outfall.

8383. (*Chairman.*) Is there any loss in volume in the process of irrigation ?—It appears that there is at times on the Beddington land.

8384. The land absorbs some part of the water ?—Yes, it is quite clear from my gaugings it must be so. On the 14th November 37 acres were under irrigation at Beddington, the quantity of water passed on in the day was 2,709,936, and passed off, 2,018,570. On the next day we had but 27 acres under irrigation; 2,745,936 went on to the land, and 2,246,688 passed off. I will fill in these particulars afterwards, and let you have the rainfalls at the same time; they fluctuate. In one case, on the 22nd of November, I see that there were 37 acres under irrigation, and the quantity of water passed on was 3,609,752 gallons, and the quantity passed off was 4,145,760.

8385. The volume which passed off was increased by the amount of rain which fell upon the 37 acres ?—Yes, and also the rain that fell on other portions of the farm.

8386. (*Mr. Harrison.*) You stated that the cost of pumping the water supply 145 feet high was about 1200*l*. per annum ?—Yes.

8387. You heard I think the evidence given by Mr. Johnson, that in case of necessity it was proposed by the local board to pump their sewage even to a height of 150 feet ?—Certainly, and with a good Cornish engine, (which is perhaps the cheapest pumping engine) I believe it would be possible to make a profit if you could get land at a reasonable rate.

8388. Taking the quantity of sewage as it at present exists, at what cost per annum do you think you could pump it that height ?—I think it would not exceed 2,000*l*. a year, taking the maximum amount.

8389. If the town becomes extended, and the area you have mentioned is covered with houses, would not the quantity of sewage be very greatly increased ?—Yes.

8390. And proportionately the expense would be diminished ?—Yes.

8391. And although the rainfall in the subsoil would remain the same, the bulk of the sewage would be slightly increased, and the value immensely increased ?—Yes.

8392. You stated just now that vegetation grew much more luxuriantly in wet weather; did you take into account the condition of the atmosphere during the wet weather as affecting the growth of the grass ?—With a low atmosphere in the absence of sun and heat, grasses appear to do well from irrigation; meadows in Scotland grow a much larger proportion of green matter than meadows in England.

8393. When there is a considerable rainfall is it not the case that the atmosphere is very much charged with moisture ?—Yes. The condition of the atmosphere in times of rainfall is specially favourable to the growth of green food. The principle of irrigation should be this, that you never allow the ground to get dry, because then the tender roots suffer.

8394. You would form an artificial atmosphere round growing plants ?—Yes.

8395. The year before last was a very dry one ?—Yes.

8396. During that year was it not Mr. Marriage's experience that the plants did not grow so luxuriantly as they did in other years ?—No doubt, and Mr. Marriage will tell you that they do not grow so well in dry seasons generally.

8397. The condition of the atmosphere has a good deal to do with it ?—Yes, and probably the clay soils. The great advantage that we found during last dry summer at Norwood may have been due to the property of the clay.

8398. Clay keeps a damp atmosphere over the surface of the land ?—Yes, or rather keeps the roots moist; in another soil the roots would dry up. Evaporation goes on, but not so much from clay as from other soils.

8399. Have you made any analysis of the water going off the land ?—Yes; at Beddington Professor Way has made several analyses.

8400. Have none been made besides those ?—Yes, and one of those was very satisfactory, it was taken after a severe frost. It had been attempted to be shown that irrigation would be an entire failure

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in frost; it was said that in such times the surface of the land would be frozen over, and the sewage would pass off in the same state as it was taken on. This proved to be a complete fallacy, for there were not more than $1\frac{1}{2}$ grains of organic matter per gallon in the water when it left the land than there were in it when originally supplied to the town as pure water.

8401. (*Professor Way.*) I was at Mr. Marriage's farm last year when the snow was lying several inches deep, and and we found the temperature of the water that was coming on to be 56°?—Yes, and it goes off at 33°. The temperature of the streams in the neighbourhood is 32°.

8402. The only land not covered with snow was the irrigated land?—Yes.

8403. At that temperature the heat of 2,000,000 of gallons of water must have been left behind in the 24 hours upon the land?—Yes; that excessive temperature is due to our taking water from a spring, our water is naturally of a high temperature of about 53° or 54°.

8404. I suppose that water loses temperature by being used for domestic purposes?—That depends entirely upon circumstances; in frost the temperature of the sewage is higher. At other times it is lower than the temperature of the water supplied.

8405. (*Chairman.*) Do you attribute that to the increased amount of fuel consumed in the houses?—Yes, or to the amount of warm water used. I was very much struck with the difference of the temperature of the water in time of frost.

8406. (*Professor Way.*) That temperature would be very beneficial to land in winter?—Yes, I made some experiments at Croydon; the maximum temperature of the water going on at a time of excessive frost was 56°.

8407. (*Chairman.*) There there was not the same amount of house consumption?—No; the very fact of the water being in motion over the land is equivalent to temperature; this has been laid down as a rule by Italian irrigators. When they irrigate with spring water in Piedmont and Lombardy it is the rule, as they go further from the spring, to increase the inclination of the falls, and so to give an increase of velocity which is equivalent to an increase of temperature.

8408-9. (*Professor Way.*) Is it not the fact that a sewer can only abstract from water a given number of degrees of temperature, so that supposing the water is at 56°, it goes on to the land at 30°, and the land will still receive some addition of temperature from it?—Yes.

8410. But will not reduce the temperature of the water below a certain point?—No.

8411. Is it not the fact that a very much larger quantity of sewage per acre is put upon the land at Edinburgh than you put on at Croydon?—Yes.

8412. Is there not a wasteful use of sewage which produces greater luxuriance?—A large quantity of sewage runs away. I look upon water as acting on manure very nearly as nitrogen does in the atmosphere; it dilutes the stimulating effect. Very strong manure will kill the plant, and as you decrease the strength, the more easily is it assimilated by the plant during the process of evaporation that takes place at an enormous rate from the plant. The habits of a plant are to take its food in the most dilute state possible.

8413. (*Chairman.*) If you irrigate with pure urine you would kill every blade of grass on the field?—Yes.

8414. And yet in the urine there is the food of the plant, but it requires dilution?—Yes.

8415. (*Professor Way.*) It may be desirable that the sewage pipes of a town like Croydon, which gives 36 gallons per head, should undergo dilution with subsoil water; but I suppose you would like to have the control of that dilution in your hands?—Yes, in all works where you can utilize the sewage by gravitation it is no matter how dilute it is; but if you must pump, then it will clearly be more economical to get the fertilizing matter in a more concentrated form; the most dilute sewage works the best for gravitation, and will produce an equally rapid growth. We find that the lower irrigation fields do quite as well as the upper ones. At Norwood we have effectually dammed back the water from coming on to the lower fields without first passing over the others, and those lower fields have grown better crops to the acre than the upper fields. The plant takes the matter out of the water more readily than when it comes first on to the land.

8416. Is not that partly due to the fact that when it comes on in the strongest form it also brings on the slimy matter of the sewage which interferes with the surface of the vegetation?—There you have the whole secret of the sanitary conditions for irrigating with town sewage. If that solid matter is allowed to go upon the land it cannot become food for a plant, because it is in an insoluble state, and while it is getting soluble and becoming food for the land it generates a noxious vapour which must be prejudicial to the health of the neighbourhood; and the great principle of irrigation is to remove as much of the solid matter from the sewage as possible before you permit it to go on to the land.

8417. How are you to do that?—An agriculturalist will tell you that in a farmyard you may let the water run away as you like provided you give him the solid manure, but we reverse that process at Norwood. We have there two chambers, the sewage runs into the first of the two, and then the floating matter is intercepted; the liquid sewage then runs into the second chamber under a deep trap, and thence flows upwards through a perforated floor upon which burnt ballast is laid, and it then flows on to the land, leaving the solid matter behind. During last summer the works at Norwood were not so complete as they are now; the system is now in full operation, and I hope the Commissioners will inspect them.

8418. (*Mr. Harrison.*) Is the water clear when it goes away?—It is much clearer or comparatively clearer than when it came on; it is not in an inky state, it is comparatively freed from matters in suspension.

8419. (*Professor Way.*) At Beddington has the water having passed through the upper meadows left behind all solid matter, and does it issue clear with enough nitrogenous matter in it to be useful to the lower crop?—Yes; after leaving the filters it goes on to one of the upper fields, and after that it is caught up again and goes on to a second field, and last of all on to a third, so that it passes over three fields in succession, and the lower fields do as well, if not better, because the liquid passed over them is clear.

8420. But containing, nevertheless, large quantities of nitrogenous matter?—Containing all the soluble real food for the plants in solution. Irrigation is a system of manuring the plant, the old system of manuring was a system of manuring the ground. I think that the fields last irrigated do as well as any; the plant has so much greater affinity for abstracting matter in a very dilute state than when it is strong. Were it otherwise we should send the sewage over two fields only, but this is a matter entirely left to the superintendent who looks after the work. If two fields will not exhaust the fertilizing matter he must put the sewage on a third, and if three fields will not do, he must put it on a fourth.

8421. (*Chairman.*) You irrigate these meadows by open carriers?—Yes.

8422. And by gravitation?—Yes, at Norwood I have got pipes. I intend to cover the whole of the main carriers, and to bring the crude sewage on to the land. The effect of the earth upon the sewage is most miraculous, for the sewage as soon as it touches the earth is completely deodorized.

8423. Have you seen farms laid out upon the principle of irrigating large areas by underground cast-iron pipes and hose and jet for the purpose of distribution?—Yes.

8424. What is your opinion of that method?—That it is a fallacy, an absurdity.

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8425. You would not recommend large sums to be laid out by individuals or a company with the hope of obtaining a profitable income by the process ?—Certainly not, neither would I advise any company taking sewage upon speculation, and pumping it through mains to trust to farmers to take it. I believe that agriculturalists are so far backward that such a company would not get one farthing from such a scheme. The only way to irrigate with sewage is to get the land into your own hands, sublet it afterwards if you like.

8426. It has been asserted by Baron Liebig that as the food for man comes from a given number of acres, the waste products of that food should go back to the same number of acres. Looking at the matter in a pounds shillings and pence point of view, do you think it is practicable to carry out what Baron Liebig says ?—I think that Baron Liebig is wrong. When you apply town sewage to a given area on an irrigating system, instead of getting one crop or two in a year, as you would by the ordinary system, you can get in 12 months seven crops ; so that one acre is, in its crop, equivalent to seven acres.

8427. Compared with the cost of irrigating one acre, with a given volume of sewage upon the heavy sewaging principle, what would be the cost of distributing that over 20 acres ; would it be 20 times more ?—The cost of distributing the sewage over 20 acres would be much more than 20 times, because you would have 20 rents to begin with, and then there would be carting 20 times, and labour 20 times.

8428. If you utilize the sewage must you concentrate it as you are doing at Beddington ?—Certainly. I see that that is the proper system. I see that 260 acres of land at Croydon is sufficient to extract all the fertilizing matter from the sewage, and I should consider it madness to go to an expensive system and to distribute the sewage by hose and jet over a larger area.

8429. Are you aware that it was proposed to form a company to take the sewage of Croydon, assuming the population to be 30,000, and to distribute it over 30,000 acres upon the notion that the excrement of an individual was quite sufficient for one acre ?—Yes.

8430. Are you aware that a company was formed and that several noblemen were on the committee ?—Yes.

8431. If the matter had not been explained, the probability is that persons would have been unwise enough to lend money to carry out that scheme ?—Yes, and the utilization of the sewage would have been thrown back for many years.

8432. (*Professor Way.*) I believe Baron Liebig's proposal was to use the sewage over the whole of a farm, and not in relation to grass only ?—Yes, and that opens up quite another field. We find that in those counties where there is most rain the produce is grass ; that is conclusive to my mind in favour of grass being the medium for directly applying the sewage, although I believe that sewage can be applied in an intermediate way, and for any description of crop. Italian rye grass is the best material we can cultivate; after three years it dies away, and the earth wants ploughing up but it still retains the crop of fertilizing matter it has, received from the sewage, so that you can at once cultivate an intermediate crop of mangolds, or some cereal crop.

8433. Would it be as profitable to grow a cereal crop as to grow a root crop ?—It would be more profitable to grow a root crop.

8434. Because you would have a heavier produce ?—Yes ; if you water a cereal crop, it all runs to straw, but when you water a root crop, you have very little waste.

8435. What area have you laid out at South Norwood ?—37 acres ; about 30 of them are irrigated and the rest are taken up by roads and land too high for irrigation.

8436. What is the population connected with that area ?—Nearly 3,000 ; but the number is rapidly increasing.

8437. Is the area of 30 acres for the application of the sewage of 3,000 persons relatively as large as the area of the farm at Beddington for the application of the sewage of Croydon proper ?—Rather larger.

8438. What is the volume of sewage per day that you can pass on to those 30 acres ?—That varies immensely, but I will supply you with that.

8439. How long have you been able to irrigate the land at Norwood ?—We began to irrigate last November 12 months.

8440. How many men do you employ ?—The land is let to a tenant ; the whole of the draining and the irrigation are in our hands.

8441. Have you heard of any sickness among the men working upon the land in the midst of the sewage ?—Not the slightest. The tenant is in the room, and he has never lost a day.

8442. Is that district well sewered ?—It was not, and it has only been so in the last two months. We have adopted some temporary expedients, and we are now draining it.

8443. Are the roads properly formed ?—There are many private roads which have been made by speculating builders that are not parish roads. They are unsewered and undrained. Last summer there were many cases of fever in that district, and I had instructions from my board to examine into the cases, and I can tell you most conclusively that in every case the fever was due to a local cause ; to one of the evils I mean which grow up with the extension of buildings without proper sewers. At the very same time that the parties were complaining of the works at South Norwood as being prejudicial to health there was running behind the houses in which the fever occurred an open ditch within 20 yards into which the whole of the houses drained ; the ditch was completely open and close to the houses. In another case there was an open ditch running at right angles, and this was within three feet of a house in which a fatal case of typhus fever occurred, and yet the parties must go some quarter of a mile further to try to discover the cause of the illness on the irrigated land instead of looking to the local cause. I asked a gentleman whether the place was healthy now, and he said it was. I asked him for this reason—that since those ditches have been temporarily covered up there has not been a case of fever in the neighbourhood. We at Croydon are suffering more from fever than they are there. This is a plan shewing the position of the nearest house to the irrigated fields, the house to which the female suffering from fever was sent, and where her recovery rapidly took place (*describing the same*). It has been stated that the district was perfectly healthy before the irrigation works commenced; but the fact is, great complaints were made as to the state of those ditches, and no doubt the whole district was suffering immensely from them. The sewage was stagnant in the ditches, and we were threatened with an injunction. General Cator is the owner of the land, and we have been threatened by the authorities at Bromley, because this ditch ran through several fields in their district into the Ravensbourne. I have met the Inspector of Nuisances for the Bromley district time after time since the irrigation works have been in operation, and I have not heard a syllable of complaint from him. Previously to my appointment the board had intended upon this part of the land colored green (*pointing to the plan*) to erect works for precipitating the sewage. There were to have been open tanks close to these houses, and these certainly would have been a very great nuisance to the neighbourhood. Certain members of the board, however, consulting the interests of the people here, recommended the board to abandon that scheme, and to take this land (*pointing to the plan*), and it is my intention to cover over these ditches, to put in pipes to drain them, and by junctions to carry the sewage on to the land. When that is carried out I believe the system will be perfect, and nothing will be seen. I have never heard any complaints made of the irrigation works. I have taken some hundreds of gentlemen over them, and I never heard one of them say that the

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place was objectionable. I only wish that the commissioners would go and examine the place. I think then they would be fully satisfied there is no nuisance in carrying on irrigation works, if properly done. During the last 12 months Norwood has been healthier than ever it has been; its rate of mortality has been lower than ever before recorded.

8444. (*Professor Way.*) Is this land likely to be wanted for building purposes?—We have a lease of 14 years.

8445. (*Chairman.*) I believe General Cator owns a great breadth of land in that district?—Yes.

8446. He would not let you have land to injure his estates?—Certainly not.

8447. But he has let you the land, and your board have taken it to do away with the foul nuisance that existed?—Certainly.

8448. You have had no other object than to do away with that nuisance?—No; our great object has been to purify the sewage. Profit has been quite a secondary consideration, but nature has done our work not only successfully but profitably. At one time we spent at the rate of 3,000*l.* a year at Croydon to deodorize the sewage, and then it was most unsatisfactory. We paid over 50*l.* a week for deodorizing and for purifying the sewage of Croydon. We tried everything that was brought forward, for the board were only too anxious to give every one an opportunity, but all the schemes failed one after another.

8449. (*Mr. Harrison.*) Do you mean to say that if you had gone on you would have spent 3,000*l.* a year upon chemicals?—Yes, and manipulation.

8450. What is the soil of the land to which you apply the sewage at Norwood?—Clay; you may say brick earth.

8451. The London clay?—Yes; plastic clay.

8452. Have you drained the land?—To some extent.

8453. Not generally?—No. I took out the original drains, which ran across in all directions, for I found that they would not answer. We drain now in a different way entirely. Some of the land was so flat that it was advisable to drain it. Accordingly, we put a drain near the foot of each field, bringing it up between the points where the water is brought on, and those drains all discharge into the next carrier below.

8454. What is the depth of those drains?—2 feet or 2 feet 6 inches, and they drain very little water. It is surprising, after the water has been on the land for a short time, how very little water goes into the drains. I do not think that drains are of the slightest use during the period of irrigation.

8455. Your view is that the vegetation should extract the fertilizing richness from the sewage instead of the soil doing it?—Exactly so.

8456. Have you levelled the field in order to irrigate it?—Yes.

8457. On what principle have you laid it out?—On what would be termed the water-bed system. Owing to the soil being clay I thought, looking to the general habit of agriculturalists to make very high ridges on stiff clay, that it would be beneficial to secure a more rapid circulation over the clay than would be got by laying out the field on the pane and gutter system.

8458. What is the fall of the land from the upper to the lower field?—It varies about 1 in 100, but I will send you the plans showing the inclinations.

8459. When the sewage leaves the carrier of what length is the pannel over which it travels?—It travels over half a chain. It often does not run directly, but in a slanting direction.

8460. How far does it run in a slanting direction?—Often nearer a chain; but we find that the water completely stops—it is very slow even on this system in running down hill—it rather has a tendency to run in a longitudinal direction than at right angles.

8461. How many times do you carry the sewage on to the land?—Three or four times.

8462. Taking it at four times, the sewage would travel over three chains?—Yes.

8463. In what condition does the sewage liquid leave the land at the bottom of the field?—Extremely pure. I have an aquarium at my house which contains fish caught in the water there, principally small fish, such as gudgeons and sticklebacks, some of them are six inches long. I may mention that at Beddington Mr. Gurney has now taken the water; we had made an outfall there to take the water away from him, but the owners of the fisheries were extremely puzzled to find that after the sewage water had been turned in, fish, instead of being destroyed, made their way up this stream, and I believe trout have been caught there. Certainly the owners of the fisheries have now put gratings across our stream to prevent fish getting up it.

8464. You say that you trust to the vegetation to take out the fertilizing properties from the water, but how is that to be effected during winter when vegetation is not going on to any great extent?—Really it does go on rapidly. Even now you may see men at work mowing at South Norwood. In Novem-twelvemonths ago we sowed the land at Norwood with Italian rye grass, and the farmers said I was mad. But the grass grew up and looked as it grew like many little green needles; but I was still more mad a few weeks after, for when the barometer was rising rapidly, and we expected frost, I turned the water over the grass and never took it off, and on Christmas Day that grass was six inches high. There had been an interval of frost, and the sewage had then gone on at a maximum temperature of 33° only.

8465. You do not expect, I presume, that vegetation during winter can take up so much as in the summer?—Not to the same extent, but still it is very active, and there is no doubt that the earth has an immense power. I do not say that the plant does the whole work. I look to the earth taking out the fertilizing properties and fitting them for the food of the plant, and then the plant assimilates them.

8466. During summer, when grasses grow very rapidly, is it not the fact that plants do not altogether depend upon the matter they find in the land, and that they throw out rootlets into sewage matter floating on the surface?—Yes; they throw out fibres and roots on to the suface, but I think that that is found to be the case not only in sewage fields, but generally in other fields where there are heavy crops. It only takes place when a crop has grown up to such a height that the bottom of the stalks are hidden from the light.

8467. (*Professor Way.*) Italian rye grass would not grow in water without earth?—Certainly not.

8468. (*Mr. Harrison.*) I wish you to compare the system you have adopted at Norwood with that of Mr. Marriage at Beddington. What is the plan by which sewage water escapes from his carriers on to the land?—The pane and gutter plan. The land is nearly level between the two gutters instead of having a slight fall.

8469. What is the length of those panes?—Very considerable, from 100 to 300 or 400 yards; but I will let you have a copy of the plan.

8470. How many chains?—About 18 chains.

8471. Would sewage turned on to the upper part of one of those panes travel throughout the length of the pane?—It is possible.

8472. Is it probable that it does?—It is often taken up again on its way.

8473. Mr. Marriage passes the sewage over two or three of those panes?—Yes.

8474. So that the sewage in his case might travel instead of three chains as in your case, three times 18 chains?—Yes; the area under irrigation varies from 22 to 37 acres at Beddington.

8475. To what quantity or land at a time do you apply your sewage at Norwood?—To about four acres.

8476. For how many hours do you keep the sewage running upon those four acres?—For two or three days in some cases on the lower fields. It is seldom off, except when the crop is being cut.

8477. Can you give us the quantity of produce you have taken off the land at Norwood?—57 tons of grass to an acre at the lowest computation during the last 12 months.

8478. Have you gauged the quantity of sewage going on to the field and going off?—Yes, and I will supply you with the results.

8479. After your experience of 12 months, do you think the system of putting the sewage on as you do at Norwood is preferable to the mode adopted by Mr. Marriage?—I do not believe the superiority of Norwood lies in the system; it is the earth. Clay is more suitable for the purpose.

8480. Have you not as great a fall in your land at Norwood?—No, it is very flat in parts; where it is flat we adopt the water bed system, that is, ridge and furrow, and where it is pretty hilly, there we adopt the other system.

8481. What fall have you given across your panes?—About 1 in 40 now. It was 1 in 30 before.

8482. What is the fall longitudinally?—1 in 100.

8483. (*Chairman.*) In speaking of the habits of plants, and of agricultural operations, do you speak as an agriculturalist or as an engineer?—I have myself farmed 200 acres of land at one time for the present member for Blackburn. During the period that I was employed on the Nantwich sewage works I was his agent.

8484. You have had actual experience as an agriculturist?—I have.

8485. You speak, therefore, both as an agriculturist and as an engineer?—Yes.

8486. Do you think that with irrigation you would have as rapid and as favourable a growth under a cloudy sky as under a bright sky?—The results appear to show that you get a better growth under a cloudy sky, but I should conclude that in the absence of light the plant sleeps. I believe that at night a plant is dormant and sleeps like anything else. I wish to say that since a certain letter appeared in the "Times" the effect of which was to show how injurious the irrigation was, and that the unhealthy state of Croydon was due to it, I have caused an inquiry to be made at Beddington, and the person who inspected the place is here. He went from house to house, and he did not find a single case of fever. The only cases that he could find were cases of whooping cough.

The witness withdrew.

Mr. C. W. Pimm.

Mr. Charles W. Pimm (of Croydon) examined.

8487. (*Chairman.*) Did you at Mr. Latham's request inspect the houses in the district of Beddington?—Yes.

8488. Did you ascertain whether there were any cases of illness there?—I found none whatever.

8489. Have you at any time heard that there was any sickness there?—No.

8490. Have you ever suffered yourself from going on to the irrigation works?—No; and I think there is not a healthier set of men anywhere than those who look after those works.

The witness withdrew.

Mr. J. Marriage.

Mr. John Marriage (of Beddington) examined.

8491. (*Chairman.*) What is the heaviest crop you have got per acre at any one cutting off your land?—About 13 tons.

8492. What length of time does it take to grow a crop of that weight?—That is generally the first cutting in the spring after the winter sewaging. I always find the first crop much the heaviest.

8493. How many crops did you get last year?—It would vary. If the grass is the first year's growth of Italian rye grass, we can mow some of it 5 times. In the next year we reduce our cuttings to 4; in the third year we get only 3 cuttings, with now and then something intermediate.

8494. Have you attempted to grow prairie grass?—No. I have as many as 6 different sorts of grass. I had 3 kinds on trial this summer, but I cannot speak to the results.

8495. You have not found any grass that is more benefited by sewage than Italian rye grass?—No. My view is, that having a constant daily supply of manure, I ought to get rid of that manure off the farm. I mean, I ought to raise grass and sell it off as soon as I can; and this for two reasons:—1st. I do not want to graze, in order to get manure from the grazing stock; and 2nd. If I graze, I may be occupying land which I require for disposal of the sewage.

8496. If you were to begin again, and had your choice, would you have a larger or smaller breadth of land for your sewage than you have now?—I think the area of land that I have now is very nearly the extent required; it is from 260 to 270 acres. I do not mean to say that if I had land lying continuously upon which I could put sewage, the water would not still be beneficial to a further quantity of land. I do not entirely exhaust the fertilizing property of the water; and I agree with Mr. Latham, that the bottom land appears to grow grass about as well as the top land.

8497. Land which receives what some persons call purified sewage gives you as good a crop as land that receives net sewage with the whole of the foul matter in it?—Yes, that is my experience; but you must bear this in mind—I think that the upper lands which get the whole of the sewage are more greasy to my heels than the lower lands, and therefore I judge that eventually we shall find that the upper lands will be richer than the lower land; but 4 years' test is hardly sufficient to enable me to speak positively.

8498. (*Professor Way.*) The land would have to have been made permanently richer if you abandoned the application of the sewage?—Yes, I think it would for several years.

8499. (*Chairman.*) I believe you do partially graze now?—Yes.

8500. How many acres?—There are about 260 acres in grass, and about 40 in arable land or with root crops; about 30 of these 40 are never irrigated.

8501. Have you turned stock upon the land during 12 months at the rate of a bullock and a sheep to an acre?—Yes, much more than that; but there is one objection that I have practically found in grazing this sewaged land, and that is this—The grass grows so rapidly and so thick that, in order to eat it down, I must put a large number of stock on; they soil the grass with their feet and cause it not to be so fattening. It is the same effect as is produced on ordinary grass by over-stocking with sheep.

8502. (*Professor Way.*) You mean that grazing is difficult to manage, not that the grass is of an inferior quality?—Yes.

8503. (*Mr. Harrison.*) Have you heard any complaints made of the quality of the grass?—None whatever.

8504. (*Professor Way.*) Is it better for milk than for feeding?—Some two years ago I offered to supply Croydon union with milk, and my milk stood many degrees higher than any one else's; but it is quite as fit for feeding oxen; only what you have to contend with is the larger amount of grass under the feet of the cattle.

8505. Suppose you cut the grass and tied it up?—I have done that, and it will do very well indeed in that way. I think that the richer I make the land the better is the quality of the feed, as long as it is kept clean.

8506. (*Chairman.*) Do you make any portion of the grass into hay?—I am sorry to say I have to do so sometimes.

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8507. You only do that when you cannot get rid of it fast enough in its green state?—Yes.

8508. When it is made into hay is it as good as ordinary hay?—I think not; it is coarser, and there is a little tendency to yellowness in the grass from the thickness of the herbage.

8509. There is too much wood in it?—Yes, it is too coarse, rather. Still, there is one remarkable fact about it—although the hay does not appear to be so good by something like 30*s.* or 2*l.* a load, I never found my cattle refuse it; it must have quality in it, although it does not appear so to the eye.

8510. Horses and cattle will eat hay made from it with as much appetite as the best hay?—Yes.

8511. (*Professor Way.*) Italian rye grass does not make such good hay as natural grass?—It is very difficult on a sewage farm to mow it at the right time; it grows so fast. Still I think that for horses, Italian rye-grass hay is preferable.

8512. (*Mr. Harrison.*) You stated that the produce from Italian rye grass diminished every year?—Yes.

8513. Do you apply the same quantity of sewage to the land each year?—Yes.

8514. For how many years do you keep the grass down?—I have some that has been down 4 years, and that has been cut thrice this year.

8515. For how many years do you find it desirable to keep it down?—Not more than 4. Any one in my situation would endeavour to put off the breaking up as long as ever they could, for when you pay a high rent per annum the loss of a crop amounts to something serious—much more than when you are renting land at a guinea per acre.

8516. (*Professor Way.*) What does the seed cost per acre?—From about 15*s.* to 21*s.* per acre. I had a crop of green grass last spring; I sold it off and ploughed the grass up, and had a very nice piece of wurzel.

8517. Are you now mowing grass from that land?—No, the land where the 3 acres of wurzel are would have been sown down with grass this autumn but for the wetness of the weather.

8518. Have you sown some of the land this autumn?—Yes, the rest of the field, 13 acres, was sown with wurzel, but it failed; or rather I broke the ground up in consequence of want of labourers. I ploughed it about and fallowed it and got it into a good state, and sowed it down with Italian rye grass about the 1st week in September.

8519. In what condition is that Italian rye grass now?—We were mowing it up to the snow coming the other day; it is only about 3 months old.

8520. If the seed for an acre of grass costs only 15*s.*, a small sum as compared with the crops you take off the land, what should prevent you breaking the ground up after the 2nd year, and immediately sowing it down again?—I should like the land to lay down in grass 3 or 4 years before breaking up.

8521. You would gain 2 or 3 cuttings?—Yes, but that year I should get but little; the young grass is light.

8522. Supposing when you had taken nearly the last crop from the impoverished plant which had been down for 2 years you broke the land up in September, or October or November, and sowed down again, would you not in the spring get a good healthy plant?—We have got to master the great amount of grass roots, and the old sward when we plough.

8523. But that difficulty would be less in the 2nd year than in the 4th?—Yes, the natural grasses increases greatly in the 3rd and 4th year.

8524. (*Mr. Harrison.*) The natural grasses will occupy the place of the Italian rye grass?—Yes, and create a large amount of grass to be got rid of.

8525. To what quantity of land at a time do you apply sewage?—From 20 to 30, at times to 40 acres.

8526. Do you turn the sewage over three patches each time?—Yes, sometimes, and sometimes over only two.

8527. How long do you keep the sewage upon the land?—From two days to a week.

8528. Do you think that the system of turning the water on only for a few hours, as pursued at Edinburgh, would be advisable here?—I have not found it so in my case. I have tried it considerably, and I have found it best to allow the grass to feel the effect of the water. I like the water to be on long enough for me to see a shoot produced, showing the plant has grown during that time.

8529. What is the quality of your soil?—The subsoil is gravel and sand mostly throughout the farm.

8530. Is it drained at all?—There are old drains that we find in cutting new ditches.

8531. Do you think those old drains are an advantage in your system of irrigation?—No; I have carefully watched that subject. In all the fields that are laid out the ditches have been well deepened so as to touch the gravel, and I have tried to notice whether the centre of the field, where there are no under drains, showed a failure of Italian rye grass as compared with the parts by the ditch, and I could find no difference whatever in the state of the herbage in the two places.

8532. Has the piece of land which you sowed with Italian rye grass in September received any sewage during the last 12 months?—Not since last April.

8533. Has the crop which you are now cutting from the grass sown last September been quite independent of any application of sewage?—Yes.

8534. Does not that show that there was a richness left in the land by the former sewaging?—I think it does, and that has rather altered my opinion. I fancied that the third and fourth cuttings of the grass exhausted the fertilizing property of the sewage put on, but I should say that this field is one of those that had the sewage net in every case.

8535. (*Professor Way.*) So that the land has been improved by the addition of the solid matter as well as the liquid?—Yes. I have got five times as much grass, if not six, on this piece of land as I have from another piece of arable land sown at the same time with the same seed, but not sewaged.

8536. What rotation of cropping do you recommend as most advantageous for the sewage irrigation system?—I think there is nothing scarcely but grass. Now and then the application of sewage to wurzel under careful management may answer. By the waterpot system you might improve a piece of wurzel very much.

8537. If you manure land with sewage while grass is on it and then take other crops, you may say that you are manuring the other crops, although not directly?—Yes; I intend this spring to lay down seven or eight acres in order to do so.

8538. (*Mr. Harrison.*) You heard Mr. Latham's statement as to the distance the sewage travelled in the case of South Norwood; does your experience agree with his, that the distance which sewage travels depends chiefly upon the quality of the land?—I should say not; our object is to keep the water on the same plane of ground if we can. If there is a fall of perhaps two feet in a considerable field, and a tendency for the water to get across the land, we block up the edges of the next carrier, so as to keep the sewage continuously flowing down the whole plane.

8539. So as to make it flow over as wide a surface as you can?—Yes, and by that means we increase the filtration of the sewage.

8540. (*Professor Way.*) Do you give to the lower land occasionally a dose of the genuine stuff?—Certainly. I very much vary it. For the last three weeks or more Mr. Latham has been experimenting with the water, and we have put but little sewage on 100 acres of the top land, and during that time the sewage has been carried on to the lower land; now again we shall put it on to the upper land.

8541. (*Mr. Harrison.*) I believe you reside in a house close to the irrigation works?—Yes, within 400 or 500 yards.

8542. Have you experienced any ill effects from the application of sewage to the adjoining land?—No,

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we are very healthy, and we have several neighbours now.

8543. Have any of them experienced any ill effects from the sewage?—No, but in the first two years before I went there there was a vast amount of filth to deal with, in consequence of the sewage not being distributed properly. I employed in the first two years 40 men weekly, and I do not know that any one of my workmen has died, or that there has been any illness of any account. I do not employ that number of men now.

8544. (*Professor Way.*) They did not complain about the occupation?—They made no complaint whatever.

8545. (*Chairman.*) I believe a considerable number of persons have visited your farm?—Yes, in the last two years.

8546. You are aware, I dare say, that the question of utilizing sewage is one of very great importance?—Yes.

8547. You are aware also that the rivers in Great Britain are as a rule fouled by sewage?—Yes.

8548. After the experience you have had at your farm, do you think the Legislature might compel towns to purify their sewage, as Croydon has purified its sewage, by passing it on to and over a certain area of land?—That is quite my opinion.

8549. Do you think that it might be done without any very great outlay?—That is dependent upon circumstances. If persons go to pumping the sewage, they will find that there is a loss; but wherever sewage can be applied by gravitation, they will get out clear. My firm impression is, having studied the subject long before I came to Croydon, that towns will never derive any income from their sewage.

8550. You mean any large income?—Yes, or any income scarcely.

8551. Still, if sewage is to be dealt with so as to render it comparatively innoxious, and you heard of a board expending 1000*l.* a year upon disinfectants and getting no return, should you not say that it would be more advisable to spend that 1000*l.* a year in pumping?—Indeed I should. I think they might face the pumping with some hope of profit, if they could get land at the price that some of our Croydon friends are imagining, about 21*s.* an acre; but I think it will be found, that generally, the landowner will step in, and will get the benefit. I know in my own case that if I was owner of land on the Hill District near to Croydon, which people are thinking of for the application of this sewage, I should ask for an increased rent directly.

8552. (*Chairman.*) You would say I think to any local board which contemplated sewage irrigation, "Be "masters of your sewage estate, purchase your land, "and if you can get it at the ordinary agricultural "rate you need not fear even the cost of pumping to "a moderate elevation; for, if properly managed, you "may make the scheme pay"?—Yes. There is one thing that I think boards of health ought to have the power of doing, and that is, of purchasing lands in the same way as railway companies do. The owner of land ought not to be able to say to a local board, "There "is my estate, if you take a part you must take the "whole of it, suitable or not suitable." Local boards should have power to take land so as to be able to irrigate here and there. In a solid block of land it is very likely there are portions upon which, on account of the natural fall, you would never be able to put sewage. There is one circumstance with regard to my land which I may mention. The farm consists of only 300 acres, but I suppose there is a length of a mile and a half from where the sewage enters to where it goes off; that is a very great advantage.

8553. (*Professor Way.*) Would you give to public boards compulsory power to take land?—Yes, if they are to be bound not to put sewage into rivers.

8554. (*Mr. Harrison.*) After your experience, how many acres of land do you think should be provided for a town, say of 1000 inhabitants, for the application of its sewage?—I think that one acre of land will take the sewage from 100 persons, but there is a very great deal of difference in the water supply; the daily supply at Croydon is 36 gallons per head, but 12 gallons per head, such as I hear is the daily supply at Worthing, I should be afraid to tackle. I think it would be too small.

8555. (*Chairman.*) Would the sewage then be too rich to put upon the land?—I should be inclined to fear it.

8556. The sewage of one individual diluted by 12 gallons of water would be too rich to put on the land?—I think so.

8557. You would have 150 times the weight of water?—Yes, but the great objection to a small water supply would be this, that it would not give me liquid enough to distribute the sewage over the land. If I were to go to the expensive system of a jet and hose, then I could cope with it, but if I resort to the flooding system I must have a larger supply of water.

8558. If you had your choice, would you use hose and jet for any purpose of irrigation?—No, it would never answer, from my experience of it.

8559. Supposing you had meadows 50 or 60 feet below and above the place where the sewage flowed down, and you had cast-iron pipes and hydrants, in what way would you prefer to put the sewage on; with jet and hose, or by open carriers?—By open carriers.

8560. Supposing you had a field of 1 acre and another of 20 acres, could you apply 20,000 gallons of sewage per annum with anything like the same profit over the field of 20 acres as over the field of 1 acre?—No, I think not. The only way in which I should meet that question would be this, that if I could get the land to suit my purposes as railway companies do, then I should apply the same quantity of sewage on to the last piece of land as on to the first.

The witness withdrew.

Adjourned till Monday, January 22, 1866.

Victoria Street, Monday, 22nd January 1866.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq., | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

LONDON.

T. Graham, Esq.

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THOMAS GRAHAM, Esq. (of Abingdon), examined.

8561. (*Chairman.*) You are general clerk to the Commissioners of the upper districts of the Thames?—Yes.

8562. For what purpose was the Thames divided into districts?—For the purpose of being managed by district committees formerly.

8563. Have you had an opportunity of reading the evidence that you gave before the Select Committee

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of the House of Commons?—I read it some time ago, and I believe it is generally correct.

8564. May we take it as your evidence before this Commission?—Yes.

8565. Is there anything that you wish to add to that evidence?—There are one or two matters in the evidence you have received that I should wish to speak to. I understand that at Oxford Dr. Adams told you that the Commissioners did not interfere in the upper district above Oxford. That is not so, for whenever we are asked to interfere we do so, and we have done so several times lately.

8566. Can you name any of the places where you have interfered in that way?—At Lechlade there was a dispute whether the Commissioners were bound to keep in repair a towing-path. I have been there two or three times about the matter. In general, although the navigation above Oxford does not pay, and I do not think it ever will, we pay as much attention to it as we can with the very limited means that we have now. If we have done scarcely anything to the upper navigation it is because the navigation of that district does not pay anything, and we have so many calls elsewhere.

8567. Have the Commissioners at any time executed embankment works to restrain flooding on the adjoining lands?—I believe none. We have no power to do so.

8568. Has it ever come to your knowledge that extensive floodings occasionally take place?—Yes, I am well aware of it.

8569. (*Professor Way.*) When embankments are made do they not affect the river considerably?—I think so, but the embankments which have been made are above Oxford, where there is really no navigation.

8570. (*Chairman.*) With regard to the navigation paying, I suppose that is a thing of the past?—Yes, as far down as Oxford. I do not know as to below Oxford. I live at Abingdon, and we have nine-tenths of our coals brought by canal to Oxford and thence by the river.

8571. If the river were renovated do you think the navigation would pay?—Yes, I think it would; but I doubt whether sufficiently to pay the old bondholders as well; if money was lent, and secured as a prior charge to the old bond debt, I think the navigation would pay the interest of the new loan.

8572. Before the Select Committee Sir Francis Goldsmid asked you whether there had been a willingness expressed on the part of the bondholders to give up their rights for a payment of 2*s.* in the pound?—Sir Francis Goldsmid was the representative of the Reading men. I know that the two gentlemen who gave evidence bought their bonds at a very low rate, and if they had got 2*s.* in the pound for them they would have been very fairly paid; one of them was very much discontented. He had made a bad speculation, had bought bonds when they were going down, hoping to get 2 per cent. It is people of this class who complain and not the old bondholders. I sent a circular to all the bondholders, asking whether they would take 5 per cent. I did get a reply from the holders of 20,000*l.* out of the 88,400*l.*, but many did not reply to the circular at all.

8573. From how many did you receive replies?—From holders of 15,000*l.* or 16,000*l.*

8574. What was the purport of their replies?—Holders of 5,000*l.* would have taken 5 per cent., and holders of another 10,000*l.* would have taken 10 per cent. Only one gentleman absolutely refused, a clergyman who has since died. He contended that he was entitled to be repaid the whole of his debt, because the money was lent for a public purpose. I do not know where to find all the bondholders; they ought to register, but they do not.

8575. You do not know where the bondholders are?—Not all of them. I daresay I know the holders of 50,000*l.* out of the 80,000*l.*, or more than that.

8576. There is no other recognized place for registration but your office, is there?—No other, but the interest is paid on the production of the bond by a banker.

8577. If you do not know them no other person can?—No, I have the books.

8578. You do not know now, neither can you find the means of communicating with all the bondholders?—No; but I know what bankers receive dividends, and I could send notice to them, and they would send it to their customers.

8579. (*Mr. Harrison.*) When was the last interest paid?—At Midsummer, 1863, and it was at the rate of 10*s.* per cent.

8580. Was that 10*s.* per cent. called for by all the bondholders?—I believe so, or very nearly all.

8581. That shows that the bondholders are in existence and would be forthcoming?—Yes; but nothing short of an Act of Parliament could deal with them, because there are a great number of trustees. I do not know what will be done, but altogether to extinguish the debt would be the first case of confiscation. A Thames navigation bond is not like a turnpike bond, given for a certain term of years, it was granted in perpetuity.

8582. (*Chairman.*) The word "confiscation" is rather a hard one. May it not be taken for granted that unless Government steps in, and gives to a new company priority over the old bondholders, the money of these old bondholders is practically lost?—Yes; but what the bondholders say is this, that the money was not lent as a speculation, as in the case of a railway company, but it was lent for a public navigation.

8583. But the security upon which they lent it has vanished, and there is no person to blame for it?—It has been the effect of railway competition, no doubt.

8584. They cannot turn round and say that it is the duty of the State to put them in the same condition as they would have been in if competition by railways had not taken place?—No, I do not at all contend that. I am merely telling you that that is the view taken by some of the bondholders.

8585. (*Mr. Harrison.*) I presume the money was lent by the bondholders, thinking that the security was as good as the funds?—No doubt of it.

8586. They did not enter into the investment as a speculation, as people often do, but trusted to the Act of Parliament which limited the amount of interest they could receive?—Yes, the investment was looked upon as a very safe one.

8587. (*Professor Way.*) Did anybody give the bondholders reason to entertain that view of it?—No, I should not think so.

8588. What the bondholders might think would amount to nothing, if there was no reason for so thinking?—No doubt, and they would have continued safe but for the introduction of railways.

8589. There was no guarantee on the part of the Government that things should remain unaltered?—Not at all.

8590. (*Chairman.*) If I had bought an estate for building, and some landslip or convulsion of nature launched it into the ocean, I should lose my land and all that represented my money, but I could not turn round and ask the Government to put me in the same position I was in before?—I cannot see that the bondholders have any claim upon the Government, excepting perhaps that, if anything is to be done, they might have the option of being postponed rather than be bound to take 10 per cent. and be dismissed, they might choose to run the risk. I am a bondholder myself unfortunately, and I think I should risk the chance of getting something more some day.

8591. The evidence of your own engineer and of other parties shows that the navigation has really become dangerous?—I am sure it is so.

8592. That some of the locks and weirs, if they remain much longer in their present condition, may come to ruin?—Yes; and I believe that our surveyor will now give you stronger evidence upon that point than before. Romney pound is in danger almost every day, and I wonder that the flood has not brought it down.

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8593. You cannot tell, until this flood has passed away, whether it has done any injury or not to the work?—I have no doubt that it must have done much injury. It is the largest flood we have had for years.

8594. You cannot call upon the bondholders to supply the necessary funds to repair the works as you might call upon the owners of an estate which was in such a condition as to injure other parties?—The bondholders are not owners, they are only lenders of money.

8595. There are in fact no owners?—No.

8596. (*Mr. Harrison.*) The owners, I take it, are the public?—Yes, the committee are appointed by the public.

8597. (*Professor Way.*) You mean the public as limited by the district?—Yes, or by persons who have property in the district, although not living there.

8598. (*Chairman.*) Have you thought about the future of the navigation, and the sort of authority under which it might be placed?—I think our board is not very well constituted in one particular point. The committee which they elect have not absolute powers, and I think they ought to have. I think the Thames ought to be under local management, for landholders living so far from London do not like to be under the management of a board in London such as the Conservancy Board. I observe by the notice of the bill that the Conservancy propose to take the soil of the river. Now the soil does not belong to the Commissioners. We claim a right to ballast only for navigation purposes, and that is all we had given to us.

8599. (*Mr. Harrison.*) Mr. Castle in his evidence before the Select Committee called attention to the necessity for giving powers to the Commissioners to dredge the river?—We have power to ballast it for purposes of navigation, but I think we ought to have further power to prevent anybody else from ballasting except under our direction.

8600. (*Chairman.*) You ought to have jurisdiction over the water and the land that the water rests upon?—Yes, for navigation purposes, but not to take out soil and sell it. It is proposed that the Conservancy should take a revenue from ballasting.

8601. Suppose it was necessary to ballast 10,000 cubic yards out of one reach, in order to improve the navigation, why should not the Commissioners or the Conservancy have the power to sell the ballast if they had no use for it?—I think they ought to able to sell enough to pay their expenses.

8602. Why should they not have an absolute right in it, if it does not injure the landowners?—But it does injure them to a certain degree, unless the ballasting is very well done, for in many cases the banks fall in from it.

8603. If that is the case the same authorities ought to have it made part of their duty to maintain the banks?—If it was part of the duty of the Conservancy Board to maintain the banks I believe the landowners would not object to the sale of the ballast, but I was going to say that I think the constitution of the committee is not badly arranged now. The electors are a very good body, they consist of the clergy and riparian owners, and are, very generally speaking, men of intelligence. But with regard to the elected committee, the objection is that they are subject to the caprice of the general body, and I think that they ought to have the entire management during the time for which they are elected, and not be liable to have their proceedings upset by the general body meeting perhaps for half an hour.

8604. Then you would deprive the general body of executive power and confine them to an elective function?—I would let the general body elect 3 members from each district as they do now.

8605. Supposing the Government decided, in accordance with the notice for a bill which you have seen, to put the whole of the river Thames under one Conservancy Board, would it answer for the present body of Commissioners to elect, instead of committees, persons to serve on the Conservancy Board as representatives of the interests of the upper Thames?—Yes, if there were a sufficient number of such representatives.

8606. Might it be arranged that those new representatives should act for the upper Thames and not interfere with the lower Thames, and the members for the lower Thames should not interfere with the upper Thames?—That arrangement might be a very good one, and I do not think it would be objected to generally. I think there would be great objection on the part of the country gentlemen to have the whole river handed over to a London board. I have heard that opinion often expressed.

8607. (*Professor Way.*) What is the present number of the Conservancy Board?—I am told 18.

8608. (*Chairman.*) Such representatives might be re-elected in the same way as a board of directors?—Yes, I think some arrangement of that sort would be very good.

8609. And then an arrangement might be made for certain allowances to cover expenses of the representatives?—I do not think they need be paid anything beyond actual travelling expenses. Travelling expenses should be paid, because these meetings must be held at different parts of the river. There ought to be at least one survey made every year; lately we have not had it done as the committee do not like to go to the expense, but I think it is a great mistake, and I have told some of them so. Our Acts of Parliament do not enable us to charge these travelling expenses; there is no clause to that effect, but actual expenses have been charged.

8610. (*Professor Way.*) I think Mr. Knox told us that the committee were strongly against any greater number than 3 being put upon the new Conservancy Board?—I think that number would be useless.

8611. What number do you think would satisfy the wants of the upper Thames?—I think the upper Thames ought to have the same number as now.

8612. Fifteen?—Yes.

8613. Then you would have an unmanageable board?—Yes, you would; but a board consisting of a smaller number than the Conservancy Board would be practically useless, because they would be always overruled.

8614. Are not some members of the Conservancy Board interested in the upper Thames as well as in the lower—the bargemen, for instance?—I think not. There is very little traffic up to Oxford by Londoners. The principal traffic is by people living in the upper districts who trade to London and back. There is some coal brought from London, perhaps as far as Windsor.

8615. The question is whether the two interests are not so bound up that a board, although the majority has been selected from the lower districts, would still find it necessary to consider the interests of the upper Thames; I presume that the condition of the upper Thames affects the Conservancy?—I do not think it does; I should think very little indeed.

8616. As far as Teddington lock, if not beyond?—From Teddington upwards it does in a certain degree, but not to a very great degree; there is some coal traffic carried on, but the greater part of it is between Oxford and Reading.

8617. (*Mr. Hdrrison.*) It is desirable for the benefit of the adjoining land, as well as for the navigation, that the river should be put under some efficient superintendence?—Yes.

8618. And it would be necessary to expend a considerable sum to put it into proper condition?—Yes.

8619. Up to the present time the money borrowed for the purpose of keeping up the navigation has been borrowed on security of the tolls alone, what would you suggest as security upon which any further money should be borrowed?—I cannot suggest anything; I cannot say that I think the landowners ought to be rated, for I do not know what advantage they derive from the navigation; they have the disadvantage of having a towing-path over their land.

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8620. If all the locks and weirs were done away with, and the river allowed to take its own course, would not the land be more subject to flooding than it is now?—I daresay it might be.

8621. Would not that be a disadvantage to the landowner?—Although the land would be more subject to flooding I imagine that the water would go off more quickly, and if it did I do not think it would be an injury, because our Thames meadows are very much improved by a flood, if it does not stay on them too long.

8622. (*Professor Way.*) If landowners are not to be taxed for support of the river, who would be the persons to be taxed as deriving a benefit?—Only those who use the navigation, and also in some degree the water companies of London and London itself. The towns are benefited, no doubt, by the navigation.

8623. But they would equally with landowners object to be taxed?—No doubt.

8624. The inhabitants of the towns are taxed individually whenever they use the navigation?—Yes. I am not able to suggest any others to be taxed. I really do not see the fairness of taxing the landowners.

8625. (*Chairman.*) Has your commission taken any steps to prevent sewage passing into the Thames?—We have no power. We have been applied to once or twice for leave to put in sewers, and we have not refused, because we had no power to refuse unless the sewers would injure the navigation.

8626. Is there any possibility of turning your Acts of Parliament into an efficient working code of regulations?—No. I think Parliament ought to repeal them and begin again.

8627. And embody all that is valuable in a new Act?—That would be the way. There is another point upon which I wish to make a remark. Mr. Witherington stated at Reading that we had allowed a certain bank to grow up near his mill; but the fact is that we had no power to remove that bank unless it interfered with the navigation.

8628. You had no interest in removing it for mere mill purposes?—No. He seemed to think that we had power, but we had not; it did not interfere with the navigation at all, we should have removed it if it had; it belonged to the landowner to remove it, or to the millowner.

8629. (*Professor Way.*) Is it the fact that for a long time past you have had no necessity to ascertain what your powers are, and you have rather fallen below the exercise of them than exceeded them?—No. We have called upon millowners to run the flashes. As to flashes, great alteration should be made; there should be more stringent powers by summary process to compel millowners to shut in. At the present time a flash is often wasted. Parties go and buy water in the upper districts and bring it down, and when they come down to the mill the owner contends that he is not bound under the Act of Parliament to draw until he has a head of water, but he has been running the water away for two or three hours before, and he ought to be compelled to shut in. Our byelaws require him to do so, but they are not so stringent as they ought to be.

8630. Would it be advisable for the authorities who may have the future management of the upper districts of the Thames to take the mills into their own hands, and relet them with specific conditions?—It would be very advisable, but I cannot imagine that sufficient capital could be raised to purchase them, it would be an expensive thing to do that.

8631. (*Mr. Harrison.*) Have the Commissioners power under their Act of fixing high and low water marks?—Yes.

8632. Have they from time to time raised their high-water marks?—I think very likely they have altered them, certainly. That is another instance which I might refer to of the Commissioners exercising their powers above Oxford. At Lechlade they altered high-water mark about two years ago, they lowered it. I do not remember any other case of altering the watermark besides that of Lechlade since I have been clerk.

8633. Where they have raised high-water mark the miller would be benefited from having a greater head of water?—Yes.

8634. Suppose that in any restoration of the navigation it was found desirable to lower the high-water marks, would there be any difficulty from opposition of millowners?—I think not. I think we could lower them now, although they have been raised. I think it is not improbable that a question of that sort will come shortly before us.

8635. (*Professor Way.*) It would not require any new powers, would it?—No; if several landowners came and complained the committee would attend to the complaint and would lower high-water mark, if they found that otherwise lands would be flooded.

8636. (*Chairman.*) Have you had to do with any parties who abstract water from the Thames?—No. A short time ago a complaint was made that Mr. Campbell, of Buscot, was going to take a quantity of water away for irrigation, but that complaint was made by a body of gentlemen who themselves abstracted a great deal more water,—the Oxford people.

8637. And you had no power to interfere?—No.

8638. (*Mr. Harrison.*) As Commissioners, one of your principal duties is to prevent flooding of the land?—No. We are merely Navigation Commissioners; we must not allow our works to flood the land, but we are not required to prevent floods occasioned otherwise than by our works.

8639. (*Chairman.*) Have actions been brought against you for flooding the land?—I never heard of any.

8640. Under your Acts of Parliament are not pains and penalties to be inflicted upon persons causing floods upon adjoining lands?—Yes, upon millers.

8641. (*Professor Way.*) Can you not enforce those?—Yes, we can.

8642. Do you not think that under a proper conservancy of the upper and lower Thames all those matters which affect the land right and left, or the purity of the water as well as the navigation, should be taken into consideration?—It would be a very good thing if it were so.

8643. At Banbury, for instance, if the Commissioners had power to stop the outfall of the sewage there?—They have not the power.

8644. (*Mr. Harrison.*) If all the bondholders were to act in concert, would they have power to take possession of the locks and different works on the river and receive the tolls?—They might enter into possession if they were all agreed, but they must keep the works in repair, for they must keep a passage open as far as the money would go before they paid a single dividend. One or two small creditors threatened some proceedings, but I pointed out to them that they would have to deal with many difficulties that they had not thought of.

8645. If Parliament does not step in to do anything, and the Thames Commissioners cannot do anything, the old lockowners would be obliged to keep up the locks for their own advantage?—Generally speaking old lockowners and millowners are the same people. They must keep up their weirs to keep the mills going, and not only that, but they must make a passage for boats in some way too.

8646. So that they would have a heavy responsibility.—Yes.

8647. That would be an argument in favour of their claiming a continuance of old lock dues as at present?—I think not, and for this reason—formerly they received those old lock dues as compensation for a deal of injury done to them. When a man wanted to pass with his barge he prevented the mill from working for two or three hours, until the water in the upper reach was of the same level as the lower, in order that the barge might be hauled up; whereas now the passing of a boat does not stop the mill working at all, and therefore all injury for which the miller was paid before is done away with, and he has got better water than he had before.

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8648. You have pound locks which enable you to lock up the water without drawing down the miller's mill head ?—Yes, and the navigation was increased wonderfully by these locks. If the miller was entitled to compensation at all, it ought to have been limited to an annual payment calculated upon his receipts for some few years before the construction of pound locks.

8649. (*Chairman.*) If Parliament thought fit to abolish the old tolls, no injustice would be done to the miller ?—I cannot say that, because the old tolls have been recognized by the Acts of Parliament, and have been bought and sold as property; but I think the compensation ought now to be taken upon what the millowners have been receiving for the last few years.

8650. Have you observed that Mr. Witherington in his evidence stated that if the Commissioners took the weirs off his hands and kept them in repair, he would at once give up all claim to lock dues ?—I have no doubt of it. I believe that every lockowner down the river would, for those weirs would be doing the mill work for him, his head water would be maintained, and he would be free to carry on his mill at a less expense. Mr. Castle, however, says that Mr. Witherington's lock is not a fair specimen, as the dues are so much lower than they are further up, as at Iffley, Sandford, and Abingdon.

8651. (*Mr. Harrison.*) Are you aware that the dues received are about one-half what they used to be before pound locks were formed ?—I do not think that that is the fact.

8652. I think you will find that it is so, that the tolls taken at Sandford and Culham in 1745 were about the same as are charged now, but now the Commissioners get about half that sum, and the old lockowners the other half ?—Just now perhaps it may be so, but it was not so when the navigation was flourishing.

8653. You stated in answer to a question before the Select Committee that the Commissioners had land of the value of 7,000*l.* or 8,000*l.* ?—I should think they had land for which they had paid as much as that.

8654. Is that land not applicable to the payment of the bondholders ?—It is very doubtful whether what has been bought since the issuing of the bonds is applicable. The bondholders took their security upon the locks and tolls then in existence, and not upon what was bought afterwards.

8655. Might not that money paid for those lands have been expended in paying off the bondholders ?—I think that in equity they are entitled to the land, but whether they have a legal claim to it is the question.

8656. (*Chairman.*) Is there anything further that you wish to add ?—I think you have it already before you that in any alteration of the Act power should be given to the Commissioners to fix tolls and to vary their tolls, and to have through rates as railway companies have. Then there is another point. Dr. Adams complained in his evidence that we did not cut the weeds. We do not cut the weeds because they hold the water back and assist the navigation rather than otherwise in short-water time. We should cut them if it were requisite for the navigation, but not for the purposes of the landowners—they may cut them for themselves if they please. The soil is theirs.

The witness withdrew.

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Mr. JAMES CASTLE further examined.

8657. (*Chairman.*) Have you been on the Thames in the last fortnight ?—Yes, repeatedly, in the neighbourhood of Oxford, since the flooding has taken place.

8658. Do you consider this a large flood or a moderate one ?—There are some peculiarities about this flood. The flood in the immediate neighbourhood of Oxford is not higher than it was last year, but at Reading the flood is higher than it has been for 30 years, at Henley it is higher than it has been for 13 years, and at Windsor it is considerably higher than it has been for some time past.

8659. Do you infer that the flooding has come from the drainage area below Oxford ?—Yes, from the Kennet and down the Loddon.

8660. (*Mr. Harrison.*) I think you stated before that you would make some observations as to the rise of the water at Sandford and Iffley. Have you done so ?—I have had some gauges fixed at Sandford and Iffley and have obtained some curious results which are not yet completed. When this flood has run down I shall be able to give you a statement. There is one curious fact in connexion with Sandford which I have observed—the water in the tail of Sandford pound lock has risen about 11 inches more than at the head, which shows that the check of which the Oxford people complain is lower down, and is between Sandford and Abingdon, or that the tail from the old lock coming in at almost right angles with the other stream somewhat impedes its flow.

8661. (*Chairman.*) Have the Commissioners power under their present Acts to dredge for purposes of navigation ?—Yes, but they have no power to dredge for any general improvement of the river, or to sell ballast.

8662. You think that in any new Act they should have such power ?—Yes, for two reasons, for the sake of general improvement of the river, and as a means of raising funds for the maintenance of the works. When there is any dredging performed in the neighbourhood of towns, the ballast is of more value than the cost of the labour.

8663. Do you think that the expense of dredging might be met by the value of the gravel when dredged ?—Yes, except in some few cases where there is a very hard bottom in the bed of the river.

8664. As at Radley ?—Yes, and Clifton Ferry.

8665. How many bridges have the Commissioners across the river for horses ?—17, and 97 towing-path bridges.

8666. Is it possible to get rid of any of them by shifting the towing-path to the opposite side of the river ?—I think not, but if steam towing were adopted then I apprehend most of them might be got rid of.

8667. Are there many ferry boats to be taken across the river ?—Yes.

8668. How many ?—19. I expect that when this flood runs down the Commissioners will be put to very great expense in repairing damage done to the bridges. Bridges always suffer more than any other part of the works after floods.

8669. Locks do not necessarily receive any injury ?—They may be blown if, as sometimes happens, the water through a mill or in a whole reach is run down rapidly so as to cause a sudden pressure.

8670. You mentioned in your former evidence that you were about to make a survey; have you that survey here ?—Yes.

8671. Can you hand it in ?—Yes; it is a simple statement of the yards and feet super of each particular kind of work from Lechlade down to Staines. I measured all the works. I ran my rods and tape over everything belonging to the Commissioners.

8672. What information does that give you ?—It enabled me to form an idea of the cost of the works.

8673. You mentioned in your evidence before the Select Committee that owners of the old locks contributed nothing towards the maintenance of the navigation for the dues they collected ?—Yes.

8674. Is that quite a correct statement ?—Quite.

8675. Have not most of them weirs to maintain ?—Yes.

8676. If there were no mills would not the weirs have to be kept in repair for the sake of the navigation ?—Not in the same kind of repair, perhaps.

8677. Still it would be of no use to erect pound locks without weirs to keep the water up ?—As to that it will be seen that in most instances locks have been brought to the mills or placed in connexion with them; but it does not follow that pound locks may

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not be erected in other places apart from the mills, and then the keeping in repair of those long mill weirs would not be necessary. At Marlow there is a very long weir which is necessary for the paper mills, and indirectly serves the lock, but that pound lock might be placed in another position, where there might be an overflow weir, or waste weirs of a permanent character.

8678. (*Professor Way.*) The lock owners only keep up those weirs as millers, not as lock owners?—As both.

8679. If there was a lock owner who was not a miller, would he keep up the weirs?—Probably; and if that were the case I must admit that the old lock owners contribute to the navigation, but no case of the kind exists.

(*Mr. Graham.*) The weirs were made for the mills, and in fact the two go together, but there is evidence to show that there was a navigation before there were any weirs. In Magna Charta there is this passage: "All the weirs shall henceforth be utterly "put down by Thames and Medway and through all "England except by the sea-coast." And our Acts of Parliament begin by reciting that the river has been navigable time out of mind except in a small part of it.

8680. (*Mr. Harrison, to the witness.*) What evidence can you give beyond what you have already given?—I am not aware of any except as to the future management of the river. As to the constitution of the Commissioners I agree with Mr. Graham. I can hardly see how a large body could be selected more appropriate for the purpose than the present body. I think there is one thing only which they lack—they do not give sufficient publicity to their proceedings. The reason of this has been, I presume, the falling off of their income, and an economy not always very wise. The Commissioners themselves have suffered because the public are not, as I find, giving them credit now for displaying that energy which I know they do display. I believe that at their meetings all matters which are brought before the committee are gone into most thoroughly and sifted; but they are in a very false position in some respects.

8681. (*Professor Way.*) That is because they cannot sue or be sued, not being a corporate body?—Yes, that is one point; another is that they really have no personal interest in the traffic. As an executive body watching the interests of persons concerned and controlling traders they are quite competent, but for increasing the trade and entering into all the details of traders' interests I think they are not qualified, and so far they are in a false position. Then they have no power to levy rates like boards of guardians, way-wardens, borough corporations, and county magistrates.

8682. (*Mr. Harrison.*) What property should you propose the Commissioners should have power to rate?—That is a very difficult question. Some land is certainly benefited by a proper maintenance of the Thames, but it is difficult to say where that land begins and where it ends. Every town and village near the river derives advantages from its maintenance, almost as great, perhaps, as those derived from the maintenance of their other highways;—that class of property might with some fairness be rated. But I do not advocate the rating of any kind of property, and I think rating ought not to be resorted to till other means have been tried and fail. The trading element has never yet been developed according to the requirements of the present day—that element should be encouraged. The mere trading interests ought to be in the hands of traders, and a body of Commissioners should be appointed to see that those traders did not exercise their privileges injuriously to the public. If those two bodies could work harmoniously together I see no difficulty in the Thames being put into a flourishing condition.

8683. (*Chairman.*) Do you think a body of traders could be found to take upon themselves the existing debt and find funds to put the navigation in proper order?—I do not believe that any commercial body would recognize the present debt at its original value. At its present actual value I think that a body of commercial men could be found, in fact I can speak with some confidence about that.

8684. Its present value being nil?—Very close upon it.

8685. Would not such a commercial body have to obtain parliamentary powers to put itself in motion?—Yes.

8686. Supposing that such commercial body got into difficulties as the Commissioners have done from want of proper funds, what must be done then?—The trading body might ultimately have to go to Parliament and ask to be assisted as the present Commissioners have asked for assistance; but I have no doubt they would, before taking that step, find cases analogous to their own in the history of railway management, where similar difficulties have been borne if they have not been overcome.

8687. Have the present Commissioners asked to be assisted?—They applied to the Board of Trade for assistance last year, before the Select Committee was appointed. At that time all funds arising foom tolls had been expended, and the Commissioners found that all the works were going to decay.

8688. Will you let the Commissioners have a copy of any report you may make of the damage this flood has done?—Yes.

8689. Are you aware by report that any serious damage has been done?—I have heard that a part of a weir at a pound lock near Wallingford has been carried away, but the whole of it has been under water since last Saturday evening. That is a weir where there is no mill. It belongs to the Commissioners, having been placed there expressly for navigation purposes.

8690. (*Mr. Harrison.*) What tolls do the Commissioners take at the pound lock adjoining that weir?—When there is sufficient water for navigation boats to pass without closing the pound lock they take none. It is simply a weir and lock put in for summer navigation, to pass boats over several shallows which exist just below Wallingford Bridge. From one end of the navigation to the other I expect to find, after the flood has subsided, that breastworks of bridges have gone away and towing-paths been injured.

8691. (*Chairman.*) Are there any funds with which to make those necessary repairs now?—Yes, there are some funds in hand now, but of course it is impossible to say whether they will be adequate.

8692. (*Mr. Harrison.*) What were the receipts when the navigation was in a flourishing condition?—Between 15,000*l.* and 16,000*l.*

8693. What was the expenditure for repairs then?—I cannot say.

(*Mr. Graham.*) I believe the money was all spent in new works, or in making repairs, or in paying off the debt, which has been reduced from 100,000*l.* to 88,000*l.*

8694. (*Chairman.*) Could the navigation be kept up with an income of 15,000*l.* or 16,000*l.*?—Yes, with half that amount, or less than that.

(*The witness.*) I think the Commissioners made one great mistake when they allowed the lower part of the river from Staines to Teddington to be handed over to the Thames Conservancy. That is one of the most populous districts, and a handsome revenue is still raised there from the traffic. It was an act of imprudence to which there would be a parallel case if the Thames Commissioners were to suffer the Oxford Canal Company to take the river as far as Wallingford. The Oxford Canal Company keeps up a brisk trade between their canal and Wallingford.

8695. (*Mr. Harrison.*) Did you say the Commissioners suffer the Thames Conservancy to take that part?—"Suffered" is, perhaps, not quite the word to use. They were willing that the Conservancy Board should take that part of the river, and they gave a donation of 800*l.* towards the formation of one of the locks in that district. Teddington, as it were, forms a natural line of separation in the river, for there is the termination of the lock district, and the termination of the tidal flow. In any rearrangement of the river

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that would be the most judicious separation that could be made.

8696. (*Professor Way.*) Supposing there is any separation at all?—Yes, and I quite think that the more the matter is examined the clearer will become the necessity for separation. There have been lately several instances in which the presence of local members of the committee has been found of the greatest service, and in which their instantaneous action has been most useful. Had they been at a distance very serious consequences must have ensued.

8697. (*Chairman.*) Supposing the government of the Thames to be placed in the hands of one Conservancy Board, the river divided into districts, and in each district a resident engineer placed, do you think it would be a wise provision to allow any Commissioners to interfere with local works and overrule the resident engineer?—No. But the cases to which I have alluded were cases where executive members of the committee called upon millers to draw their weirs in flood time. Similar necessities would arise for the intervention of local members of the committee, even if there was a resident engineer in the district, for a resident engineer, however active he may be, cannot be at all places and at all times on the river.

8698. No, but his lock-keepers would be there?—Yes, but lock-keepers are generally utterly powerless as against millers.

8699. If lock-keepers were armed with sufficient power and authority they could always report, and you could give a lock-keeper the same power as any individual Commissioner?—Perhaps that would meet the difficulty, but it must not be forgotten that pound keepers are unskilled working men, apt to make mistakes in matters requiring judgment and discretion.

8700. (*Professor Way.*) Did you not say that individual members of the committee would interfere in a case of emergency and give directions?—No. What I meant to say was this, that under the present Acts of Parliament, if millers do not draw their tackle after the water has risen above a certain height, two Commissioners may call upon them to do so.

8701. Would not that rather be the proper function of the engineer, or of subordinates?—Yes.

8702. Are there any other points on which you can give us any information?—It has occurred to me that a satisfactory working body of Commissioners might be formed by representatives of the interests of counties and towns; for instance, Wiltshire, which has an inconsiderable river frontage, might be represented by a Commissioner appointed by the Wilts bench of magistrates, and another commissioner might be appointed by the town of Cricklade. Gloucestershire, again, which has a similar river frontage, and about the same direct interest in the river, might be represented by one Commissioner appointed by the county magistrates and one from the town of Lechlade. Oxford might be represented by one from the county, one from the university, one from the city, one from Benson and Dorchester, one from Caversham, and one from Henley. Berkshire might be represented by one from the county, one from Abingdon, one from Wallingford, one from Reading, one from Maidenhead, one from Windsor, and one from Windsor Castle. Buckinghamshire might be represented by one from the county, one from Great Marlow, one from Eton, and one from Eton College. I think you will find that these numbers represent as equally as possible the extent of the river frontage, making about 21.

8703. (*Chairman.*) How are these representatives to be elected?—Representatives of the boroughs should be elected by the corporations, and representatives for the counties should be elected by the magistrates at quarter sessions. A body of that kind, if formed to act in connexion with a trading company, might have further powers given to them than the present Commissioners exercise.

The witness withdrew.

Adjourned till to-morrow at 11 o'clock.

Victoria Street, Tuesday, 23rd January 1866.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq., | GODFREY LUSHINGTON, Esq., Secretary.

J. BAILEY DENTON, Esq., examined.

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8704. (*Chairman.*) You have had very extensive experience in land drainage?—I have.

8705. In different parts of the country?—Yes.

8706. Have you devised and carried out land drainage in the valley of the Thames?—Yes, in many instances.

8707. Are you acquainted with the valley of the Thames generally?—Yes.

8708. Have you prepared any information to which you wish to draw the attention of this Commission?—There are one or two matters which I should like to be allowed to treat in my own way. Having used the term "river economy," I wish to explain very shortly what I mean by it; I mean the full service of which a river is capable, including supply of water to the inhabitants within its basin; outlet for land drainage, and sewage of towns; utilization of the river for navigation, irrigation, flushing, motive power, and other purposes for which a copious supply is required, and the utilization of the water as a vehicle for distribution of sewage when diluted sewage is a *desideratum*. I should also add that the maintenance of a full body of clear water in the river in order to secure its full enjoyment as a fishing stream, and as an object of picturesque beauty, is an essential requirement. I consider that all these objects are compatible with each other,—in fact that it would not be necessary, as it is frequently said to be, to deepen the river or to lessen its volume, in order to secure an effective outfall for drainage. First of all, I would speak as to water supply; I hold that each river basin should furnish a supply of water to the inhabitants within the basin. I can conceive no instance, however numerous a population may be, in which this would not be possible.

8709. (*Mr. Harrison.*) If the river were properly cared for?—Of course. In my opinion the practice of gaining a supply from one valley in order to satisfy the wants of another is unjust so long as the resources of that other valley are not fully utilized; I should desire to take the basin of the Thames as an exemplification of this statement. The number of acres in that basin is I believe about 3,333,000, and the number of inhabitants about 4,500,000, that is nearly $1\frac{1}{3}$ or more accurately 1·35 of inhabitants per acre. Those figures apply to the whole basin down to the lowest limit of the Lord Mayor's jurisdiction. However, as I do not know the volume of water that passes into the sea at that point, I will confine my observations to the upper parts of the river. Now it has been stated on received authority that 380,000,000 of gallons per diem passed over Teddington Weir, during one of the driest years

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on record, but I have reason to believe that that is an excessive estimate. Assuming that quantity to be correct, it represents rather more than six times the consumption of that part of the metropolis which is dependent upon the Thames above London for its water supply.

8710. (*Mr. Harrison.*) Taking that consumption to be about 60,000,000 gallons?—Yes,—exclusive of the river Lea and the New River. I think that we shall be wise in considering the minimum quantity of the water in the river to be five times rather than six times greater than the quantity of water supplied to the metropolis at the present time. But then, I hold that the minimum is no indication of the capability of the river to yield a supply of water. We should have recourse to storage. The mean daily flow, which, (in the shape of springs,) and the outflow of under drainage, forms the perennial supply of the river, is of course very much more than the minimum; we should therefore pay more regard to the quantity of water obtainable when the springs and unpolluted sources of the river are at their maximum, for they are then yielding an excess capable of application in times of reduced flow of the springs. In speaking of springs I include deep under drainage, which is closely akin to springs, except that the one is perennial and the other, in certain soils, is only periodical.

8711. But it approximates to the perennial character in other cases?—Decidedly, in very many instances drainage in free soils has originated a constant outflow. If three inches of rainfall are discharged into the sea by the river from springs and under drainage, exclusive of storm water, the total quantity of water which passes through the metropolis in a year, from a collecting area of (say) 3,000,000 of acres, is 204,000,000,000 of gallons which gives a mean of 560,000,000 daily, and this is 180,000,000 more than the minimum quoted. What I wish to convey is this, that this difference (which need not be very accurate to prove my meaning) is ample to supply any number of reservoirs to compensate for the abstraction of the springs in times of drought, so as to furnish a supply of water from the fountain head at all times of the year for the population not only of London, but also of the whole of the basin. I would suggest that compensating reservoirs should be made to receive in times of plenty so much of the excess as would be sufficient to maintain in times of drought the quantity required to keep the river at its full height.

8712. And to give a uniform flow of water?—Yes. By these means towns along the course of the river and its tributaries might be supplied direct from the sources; and what they took at the time of a reduced supply would be compensated for by the storage in the reservoirs. I see nothing in the river Thames to preclude it from such an arrangement; every main tributary should have its compensating reservoir large enough to hold its required quantum. Certain springs would be preferred to others as being softer and more free from lime, and in many instances the pure water of under drainage might be preferred to springs. Minor springs and the discharge of land drainage, might, in like manner, be made serviceable to small towns and villages (as I have proposed in a recent publication should be done), and if the country people were satisfied with 20 gallons per diem, (and I hold that 10 gallons for village people is sufficient,) about nine people would be supplied from each acre of discharge. Each acre of land will discharge 67,866 gallons per annum, taking three inches as the rainfall which passes to the rivers either by springs or under drainage. I believe that Mr. Beardmore gave ·293 inches as the result of his experiments at Staines, and according to my own observations 3 inches of rainfall is the quantity which finds its way to the sea.

8713. That is, 3 inches, exclusive of the floods?—Yes, the perennial supply including the discharge from under drainage.

8714. (*Chairman.*) You would recommend that the water should be taken from the spring heads or sources, or from some other equally pure source, and would give to the river for that abstraction an equivalent volume from compensating reservoirs?—Yes, that is precisely my view.

8715. I suppose under certain conditions the compensating reservoirs might themselves be drawn upon for a supply?—No doubt they would be.

8716. From your knowledge of the geology of the valley of the Thames, do you think there would be any difficulty in finding sites where reservoirs of sufficient capacity would be made, I mean sites where the subsoil would be sufficiently retentive to make it certain that the reservoirs would be successful as hydraulic works?—That is a question which requires very great consideration before giving an answer; but, speaking from some observation I may say that I believe there would be no difficulty. I do know instances in which springs themselves are lost, at least partially, in porous strata, in passing from their source to the impervious strata. That is an additional reason why storage is worthy of consideration. The very water that is lost in passing from the source to the outlet may find vent again in the same basin, and in all probability does so, but it is lost, at any rate, for purposes of utility.

8717. Have you had experience of the oolites?—Yes, considerable experience.

8718. You know therefore that what are called swallow holes occur to a very large extent in some parts of the oolites?—I do.

8719. You could by sinking a shaft in the oolite get rid of a large volume of water, if that were an advisable method of getting rid of surplus water?—I am glad you have put that point to me, because my experience enables me to speak with some accuracy upon it. I have drained estates and I have disposed of the water by discharging it into porous oolitic strata the principle of action being that we should collect the water from the clays, and when we cannot utilise drop it into the next stratum of porous earth.

8720. (*Mr. Harrison.*) Using that porous stratum as a reservoir to give a double quantity of discharge at the springs?—Yes; and until we fully appreciate the conditions and properties of the porous strata of the earth, not only in such utilization as we are speaking of but in draining itself, we shall not understand the water economy of this country. When I suggested this mode of discharge some years ago the particular porous stratum of which I was speaking was the chalk formation within the London basin; I feel certain that an appreciable quantity of water can be dropped into the chalk by perforating the clay over it, and letting the water pass away to the Thames underground for the supply of the London deep wells instead of above the ground.

8721. (*Chairman.*) If a person was to construct a large impounding reservoir upon such a stratification as chalk or oolite, say a reservoir containing 60 or 70 feet vertical of water over 100 or 200 acres of ground, he might find that his work instead of being a storage reservoir was really useless?—Decidedly.

8722. It would require a considerable amount of practical skill and experience to avoid errors of such a kind?—Most decidedly.

8723. It would require as much skill almost in selecting a site for a reservoir as to make it?—No doubt. There is no question but that you may so construct a reservoir upon a porous base that it shall not hold water; but admitting most fully the necessity for great discretion in the selection of a site for a reservoir, what I have now been led to speak of is this, that if the geology of a district is carefully studied you may have a covered reservoir in a stratum that passes beneath by which you can deliver into a district at a lower level—*i.e.* at the outcrop,—the water you have discharged into it above.

8724. (*Mr. Harrison.*) And make that porous stratum in fact the natural reservoir of the pervious stratum?—Exactly so. I have carried out works of the kind for which I have perhaps laid myself open to criticism, but they have answered, and that is enough. I will give you an instance. I was consulted by the

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justices of the county of Kent with regard to the sewerage of the lunatic asylum at Maidstone. I found that a system of cesspits had been adopted all round the asylum, close under the very nose of the inmates, and close to the foundation of the building. The sewage from the building was thrown into the cesspits, which were constructed in the Kentish rag; all the solid matter was upheld whilst the liquid passed away. This residuum in the tanks was in my opinion highly injurious to the asylum, and I so reported to the authorities. I was asked to devise a scheme of discharge, and of course the first thing I did was to abolish those cesspools, to collect all the sewage into one drain, and then the question was what to do with it. I did not like to disregard the utilization of the sewage, so the plan I suggested, and which has been carried out successfully by Mr. Martin Balmes, the county surveyor in conjunction with me, was this: we carried the sewage to the lowest place on the property of the asylum, and there discharged it into a tank, where the solid matter was precipitated; then after passing the liquid through a series of filtering tanks we discharged it in a comparatively pure state into the fissures of the Kentish rag, where it disappears and we see no more of it. I should say a shaft was made, and everything done to render the process innoxious.

8725. Where do you think that liquid would reappear?—I have not traced it, and I must admit that I do not think the system is free from objection except as an interim expedient. I believe to pass away that liquid, pure as it appears to the eye, and impure as I know it to be, chemically speaking, is only to be justified by expediency. I will now address myself to drainage. The best drainage of valleys is the adoption of drains away from the rivers, that is, drains following those "slaths" or hollows always incident to valleys, instead of drains going direct into the river itself.

8726. That is for arterial drainage?—Yes; the outlets of course would be below any existing artificial or natural dams in the river, such as weirs, mills, &c. With regard to the Thames valley, the whole should be subdivided into drainage areas or districts corresponding with such outlets. The outlet of one district would discharge through the upper portion of the next lower district, while the drains of the lower district would run under the upper outlet drain, and effectually drain lands adjacent to it. The river would then be fed by a quantity of water, increased by the amount rescued from evaporation, and this would make the quantity required for compensation so much less. In order to make myself intelligible upon this matter I have brought with me a plan of a drainage carried out in the valley of the Test. In that case Lord Palmerston said, "I will have my river full, and I will have my "lands drained. If you cannot drain my land without "lowering the river you are not the person to conduct "the work." I was then representing the company who were about to do the work, and I will now explain what was done. (The witness explained by reference to a plan the drainage works which were carried out at Broadlands and handed in the same marked A.)

8727. (*Chairman.*) You followed the stream down its course until you got the requisite fall to drain the land parallel with the river?—Yes. These outfall drains ran as it were parallel with the river, and being at a lower level than the river, except at their exit, afforded means, not only of draining the lands on each side of them, but of discharging sewage from the towns above after purification and irrigation. This disposes of my remarks upon the mode of draining valley lands. With regard to motive power and the use of water for irrigation or other purposes, it is my belief that all these objects can be attained at the same time that drainage works are carried out. In order to preserve the navigation and secure means of irrigation from a river, it is necessary that the water should be maintained in the river at such a height as to preclude the drainage of the adjacent lands directly into the river. There is no greater mistake than to suppose that maintenance of high-water level in a river is detrimental to land drainage. If such an outfall drain as I have described were afforded for drainage of lands on each side of a river, it would be advantageous rather than not to have the river full, or even embanked. So long indeed as drainage of land was ignored, as in former times, embanked channels were an evil; if but an outlet is obtained with a full discharge given to it, retention of water in the river does good, as in many instances it will enable the lands to be irrigated, whereby vegetation may be maintained in times of drought. It serves also to maintain a good supply of water for stock; it affords means of flushing drains, and it affords a facile means of diluting sewage where it is applied to meadow land. There are many reasons that arise for dilution of sewage. Besides all this, it has the very great advantage of maintaining the navigation and water for mill power, good fishing, and the picturesque appearance of the river, which we all so much admire, but which in our ardour for drainage we have been led to disregard.

8728. (*Chairman.*) Have mills come much in your way in carrying out your drainage operations?—Very largely.

8729. They have fettered and interfered with your proceedings?—Immensely.

8730. Would you say that in any future legislation with respect to outfall drainage relief should be given to landowners from the arbitrary power vested at present in millers?—Yes; powers are given under the Act of 1861, but they work very badly.

8731. You have recommended a practical scheme for obtaining an outfall without reducing the level of the river and without reducing the mill head, but you are no doubt aware that millers contend that they have a right to prevent any surplus water being hurried into their mill tail which once went into their head or belonged to them for power?—Yes, but I think this arises from not fully understanding the subject. I should like to place in the hands of this commission my report upon the valley of the Test. I took some pains there to show that so great a quantity of water would be gained by reduction of evaporation (in the valley of the Test and many other similar valleys evaporation is enormous) that a motive power of a very large amount would be created. Still, in many cases existing mills must be removed—I mean those which have been built without regard to drainage. Some millheads would fit in with a drainage design. The result of systematic drainage upon the whole would be that we should gain an amount of power far more than sufficient to compensate for the destruction of the mills found inconsistent with draining. If you would consider the proposal that I have made for constituting a valley into a series of districts draining district A through B, district B through C, and district C through D, and that the districts were multiplied down the valley, you will see that each successive district would receive more water, and on the whole there would be a very large accretion of water. For instance, A would have its water head somewhat reduced, for the soil having been made capable of absorption the water would no longer flow over the surface into the mill-head, but it would be discharged at the tail; but, on the other hand, the head of the next mill would gain an accretion of water, and that would satisfy district B. When we came to C there would be a still greater accretion of water, and then at D, and so on; but A must be compensated.

8732. Would it not be necessary to have some special power to remove the mills and to compensate the owners?—No doubt; we still want greater facilities than we have. I will now, with your permission, explain how I should suggest the river Thames should be managed in carrying out such a project as I have placed before you. There should be a central commission to deal with the valley of the Thames and its tributaries, forming the whole basin into one paramount district, which should be divided into subordinate districts according to outlets. The central board would consist of representatives of all the interests affected, such as the Board of Conservancy, the municipal authorities of the different towns on the banks of

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the river and the navigation, as well as the chairman of the minor districts. The duties of the central board would be to maintain the river and outlets for the various districts in proper order. The cost should be fairly distributed over the various districts and towns benefited by the sewerage and the improvement of the navigation, and by the mill power that might be created or preserved; in fact all parties deriving an advantage should contribute. The several subordinate districts would contribute in lump sums to the general outfall in the same way as parishes contribute to a district Union.

8733. (*Mr. Harrison.*) You consider that all towns in the basin of the Thames, whether near to the banks or at a distance, have an interest in the river?—Exactly so, and I wish particularly to impress upon the Commissioners the necessity for each basin, if it be of a magnitude to require control, becoming the limit of a central commission. The Land Drainage Act, passed in 1861, is now working favourably but slowly. Districts are being formed, but the drawback is this: Each district so formed is independent of the adjoining districts and of those that must be formed afterwards; instead, therefore, of doing unmitigated good, the Act, speaking generally, is leading to all manner of derangement.

8734. Should the valley of each tributary be compulsorily put into a proper condition with respect to arterial drainage, or should it be permissive on the part of those owning the property, whether it was done or not?—I am undoubtedly of opinion that whatever is done by one district should be done with some regard to what must subsequently follow, and that the discharge of the water of an upper district into a lower valley, without providing for the ultimate discharge of the water collected in that lower valley, is an error, and causes mischief.

8735. An improvement in one part might be injurious to another unless a complete system were carried out throughout the river?—Decidedly.

8736. (*Chairman.*) Do you know how the Thames Commissioners, as distinct from the Thames Conservancy, are constituted?—No.

8737. It appears that the number of persons who can qualify as commissioners, ranges between 600 and 700, would you contemplate such a body as that continuing in existence?—Decidedly not.

8738. Supposing the Government were anxious to construct a working board to manage the valley of the Thames; would you have the board elected by owners of property in the valley, or would you have a purely Government board nominated by the central authority?—I do not think you could exclude the element of the representation of the land altogether.

8739. If taxation was to follow?—Yes; but I believe that a central board would work very well consisting of Commissioners to represent the districts, one representative to each district, in conjunction with the representatives of other interests.

8740. I see on the map that there are upwards of 25 districts, representing as many tributaries, would one representative be sufficient for each of these areas?—I do not know that. Regard should be had to the quantity of land that would be immediately benefited by the improvement of the Thames. I find that districts formed under the Act of 1861 range from 1,000 to 15,000 acres of land.

8741. (*Mr. Harrison.*) In cases where the Act of 1861 has been brought into operation, how far from the river has land been taxed, and how has that been decided?—You can tax no land that does not derive a benefit from the works. The rate is apportioned according to the benefit.

8742. (*Chairman.*) Suppose you were draining one estate and that in the adjoining estate a better outlet was provided, so that the surface water and even the subsoil water of both estates were carried off; could you in such a case buy any portion of the cost upon that adjoining estate?—Understanding the question to apply to private estates, my answer is that the power to do so does exist, but the difficulties of exerting it are so great that little is done that ought to be done. The Act of 1861 has only made matters worse than they were.

8743. Who decides if there happens to be a dispute?—Under the Act of 1861 the application is to justices in petty sessions, with appeal to quarter sessions. Under other drainage Acts we must proceed under the Lands Clauses Consolidation Act, just as railways proceed for the acquisition of land. I wish only to add that, in the division of a valley into subordinate districts, I see nothing inconsistent with the discharge and utilization of sewage. For instance, supposing on the Thames that in the Oxford district the discharging point is either below Sandford Lock or Abingdon Lock, and below that lock another district were formed, then there would be power not only to drain the land of that lower district, but also to discharge upon it the sewage from Oxford, with such purification or utilization as it might be found proper to adopt.

8744. Without lowering the river water, or the water of the tributaries round Oxford?—Without lowering it at all, but only rendering the surrounding land dry.

8745. You would remove the present waterlogged condition of the land, and yet keep the river and the tributaries at something like the present dry-water level?—I would rather have them higher than lower. Such a plan for the relief of Oxford would form the means of discharging the sewage of Oxford, and also of applying it in the most profitable way to land. I believe that for the application of sewage to meadows, whether in a concentrated or in a highly diluted form, gravitation from a higher to a lower level will be found the most profitable mode of irrigation, and this is what a combined system of arterial drainage would secure.

8746. (*Mr. Harrison.*) Simplicity and inexpensiveness are important elements in success?—I do most firmly think so.

8747. (*Chairman.*) And concentration?—Yes, where extreme fertility is required; but I do not know of cases in which highly diluted sewage is more highly prized than concentrated sewage. I mean cases where sewage is applied to market garden ground or to meadow land, where the object is to revive the vegetation late in the autumn.

8748. And not to alter its character?—Not much to alter its character, except what would necessarily follow from the small amount of fertilizing power that would still be within the liquid. I think I have stated all I had to say with respect to "river economy" generally, and I shall be very willing now to give any explanation that I may be able as to the effect of under drainage in increasing the supply of water to rivers, and how far the mode of drainage affects the supply.

8749. You have paid lengthened attention to meteorology?—I have.

8750. Experience shows that there is a greater rainfall in one season, and a smaller in another?—Just so.

8751. The minimum rainfall of the London basin is 16 inches, and the maximum is 32 inches. As an engineer, if you had water to store for any purpose, you must base your calculations on the minimum?—The minimum and maximum.

8752. I mean you must take for your basis the minimum of the driest season if you are to form a safe estimate of what your reservoirs will yield you?—I have already stated that where storage is resorted to, the minimum hardly applies, as the object of storing is to have water when it is plentiful for supply when it is scanty.

8753. For the safety, however, of your works, and that they may not be broken down and destroyed, you must know the maximum?—Yes.

8754. Have you gauged for any lengthened period the actual flow from any given ascertained area?—No, and I should think no one else has. I have had my attention directed to the matter for many years, and I really never could find the district where any reliable experiments could be carried out to a large extent;

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from this circumstance, viz., that the water, which may fall on the surface, may be absorbed, and find its way into the lower depths even in the passage of a few yards. At the present time I am draining land in the clay, and my drains sometimes do not discharge any water at all; although in parts of certain fields the pipes will be overloaded with water, none comes from the outlet. I have known this to occur in the same field. A part of the field may be in London clay, or in the drift of it, very dense in character, and having gravel veins that shall bleed copiously. Another part may be in chalk. You may drain the clay, and bring a great quantity of water out of it; but as soon as the water touches the chalk down it goes and disappears. I have designated this "unsatisfactory drainage," for nobody will believe that drainage is doing any good where no water comes from the outlet.

8755. (*Mr. Harrison.*) You might have stopped your drainage when you got to the point where the chalk appeared?—Yes, and delivered a beautiful flow of water. I am desirous to express an opinion that experiments to ascertain the amount of water flowing from a large area are most difficult to carry out, owing to the great diversity of soils.

8756. If you wished to classify soils according to their absorbent qualities, into what classes would you divide them?—I should of course divide all soils into pervious and impervious, or into clays and free soils. By pervious, I mean lands that require no drainage, and free soils that are wet to the brim from the water that passes over impervious soils into them, or which passes through those free soils, and finds vent at the surface.

8757. Among pervious soils you would class chalks and oolites, and some sandstones and limestones?—Yes.

8758. The water passing into them becomes the source of the perennial springs?—Exactly so.

8759. Those subsoils do not require drainage, and any system of drainage carried out in them would have no effect?—None whatever; the water would pass by drainage to a lower subterranean level, and find a vent by springs at the outcrop.

8760. Wet free soils are frequently formed, I presume, of alluvial matter, and in other cases are of the same character as those we have mentioned as pervious soils, except that the water from below rises through them to the surface?—Your explanation hardly wants improvement. They consist of free soils in a basin of clay or rock, which is impervious; the water that injures them is collected from the surrounding hills, and rises to the surface and overflows at the surface. In other cases you have a porous stratum outcropping at a very slight inclination. If the surface of the ground is precipitous, the line of outcrop of the water is very little above the lower line of the outcrop of the porous stratum. But where the ground is flattish, then the area surcharged of course is greater.

8761. Supposing such a soil to be left in its natural condition, what would become of the water coming to the surface; would it be evaporated, or find its way to the river?—A small part would find its way to the river and a large part would be evaporated—a very large part.

8762. What is the effect, from your knowledge of drainage, of such land upon the river supply?—I consider that a right appreciation of the mode of draining these free soils is of the utmost consequence in the water economy of this country. Clays you cannot drain too much; the more drains you put into clays the more perfect will the drainage be, and the better will be the growth of the vegetation on the surface. Cost alone limits the procedure; but with free soils it is altogether different, and I hold that those free soil beds or outcrops should be viewed as the "sponges" referred to by Lord Palmerston in a letter I read some years back before the Institution of Civil Engineers as the source of continued water supply. At the present time I am sorry to say that such is the ignorance in matters of drainage, that the wetter the soil is the more drains people put into it, but there cannot be a greater error; but in the case of free soils you only want to provide a vent, in order to set into motion the whole water throughout the saturated region, and one drain will frequently do the service of many. But what I think the Government is bound to do is to see whether we are not at this moment overdraining the free soils at the expense of our river supply. One or two, or a few drains, put into free soils which are kept saturated by a collection of water from the surrounding heights, would be enough to take off the surplus water; whereas, if you drain those free soil beds with a multiplicity of drains, the water is discharged from the water level as quickly as it rises above it, instead of its permeating the soil throughout the bed to fall by gravity to the few drains you have to discharge it.

8763. You think there is no chance of overdraining clay soils?—You cannot put too many drains into clay soils if the cost does not restrain the outlay; but then there is also the water supply to be considered. When May comes clay lands cease to discharge; but during the period from November to May, when all the country is surcharged, clays are discharging a large quantity of water, equal, in the aggregate, to 3 inches over the surface drained, and this should be collected for farm and village uses. As to the quality of the water, I know there is a difference of opinion; it may be impregnated with manure from the surface, and so on; still a great deal of water that passes through the drained soil would be better than what is now obtained for the supply of villages and small towns, and a supply of that is far preferable to no supply at all.

8764. Can you state what are the proportions in Great Britain of the three kinds of soils you have mentioned?—I would rather quote from the figures I have published (*handing in a publication*).

8765. You say that there are about 1,700,000 acres drained up to 1863, while of undrained free soils there are 12,000,000 acres; of clay soils undrained 9,000,000 acres, leaving about 33,500,000 acres of pervious soils not requiring drains. This makes a total of 56,352,000 acres?—As the contents of Great Britain.

8766. So that the extent of land now drained is under 2,000,000 acres, as compared with 21,000,000 which are now left undrained?—Yes; of course there has been some slight increase of land drained since that return was made, but I have had much corroborative evidence that those figures are pretty nearly right.

8767. When you have drained clay land, can you state what is the proportion of water that flows away after it is drained as compared with the quantity that flowed off before it was drained, the remainder being accounted for by evaporation?—I have never tried any experiments with undrained lands, but the problem is well deserving national attention.

8768. Have you observed the effect of deep steam cultivation upon clay soils after drainage?—I have. I have cultivated with steam on my own farm, and I have been a close observer of the effects of such cultivation by steam; where there has been a breaking up of the surface, the effect is to let all water that reaches the surface into or through the soil; whereas, in the case of imperfectly cultivated land, a very large proportion of the water flows off the surface; — even of well-drained land. The theory, that drained lands will diminish floods does not hold good, for it is a certainty that the primary object of drainage is to afford a rapid discharge for all water that finds vent at outlets, and the water thus discharged from the drains is added to the quantity that finds a passage over the surface whether of undrained or drained lands. In this manner the tendency of drainage is to increase floods; I admit, of course, that if drainage consisted simply of under drainage, the tendency would be to render floods less frequent, because the water passing through the 4 feet crust of the earth suffers a detention before finding its way to the river, and therefore if rain be not repeated very quickly, a flood may not take place; but as we find that all persons in constructing drains aim at a rapid discharge, and seek for

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an outlet for the water that passes through the soil by improved outfalls, the effect is more than counteracted, and I find by experiment, that when clay lands are charged up to the full extent of their capability of retention, if rain follows upon rain, half the fall will be discharged out of the drains within the period of the fall.

8769. I believe your experiments prove that in continuous rains the amount of water discharged from thoroughly well drained clay lands per diem very much exceeds the quantity discharged per diem from pervious soils where the drains are placed at larger intervals?—Decidedly.

8770. Is it to drainage that we may attribute the fact that in the Thames valley the floods appear two or three days earlier after rain than they used to do some years ago?—I can well understand that it is so, and I am perfectly satisfied that as drainage extends the effect will be greater.

8771. The object of stiff clay drainage is of course to make the soil approximate as nearly as possible to the condition of the second class of free soils, and the nearer it attains that condition, the more will the discharge of water be of a perennial character?—The perfection of under draining of clay soils is to get rid of the excess of water as quickly as possible. I do not consider that the perfection of draining a free soil is the same. So long as I can keep water from the surface of free soils by reducing evaporation and get rid of the chilling effects of evaporation, I am satisfied; the fewer drains the better; and the result of few drains is really in many cases to create a perennial flow, whereas we should not be satisfied if we created a perennial flow in clays. We like the flow from clay to cease altogether early in spring, with as early a discharge as possible in autumn.

8772. (*Chairman.*) Have you ever observed what length of time it takes after heavy rains to bring into operation the drainage discharge from thoroughly drained clay lands?—Yes, but of course circumstances govern effects. I will give you an illustration of that from the past year. September was a very dry month in fact there was no rain; in my district the quantity recorded amounted to only $\frac{2}{100}$ths of an inch, and that was due to dew. In October I recorded from my rain gauge 6 inches of water, and yet I had no discharge from my drains. All the six inches were absorbed in satisfying the thirsty appetite of the soil. The long continued drought had increased the intersticial spaces, and multiplied the pores to absorb the water. But when the month of November came, I found a great change. The land by that time had been satisfied to repletion by the fall in October, and it discharged what fell in November with instant effect. Now that is a fact which I think bears upon the question now under consideration, for I observed that the undrained farms adjacent to my own were still discharging no water whatever; there was no water in the ditches, although there had been those 6 inches of rainfall in October, and a very fair average fall in November. It was not until the latter end of November that the ditches were running water in the undrained farms. I think that must satisfy you that there will be a very great accession of water to our rivers from the drainage of even clay lands in particular seasons. I hope to be able to show by some inquiries I am making how far the springs which supply rivers are dependent, not upon the quantity of rain that falls, but upon the time when it does fall, and upon the interval between the falls. I will repeat, however, that the question of the effect upon the river supply of the discharge from under drainage will be a question of the greatest consideration at no very distant day. At the present time it is not a matter of so great moment, but its importance is accumulative, and I think it is our duty to provide for the future.

8773. (*Mr. Harrison.*) Have you ever turned your attention to the possibility of supply from collection of rainfalls from tops of houses?—I can mention a circumstance within my own observation. I was enabled on my own farm to supply my cattle with water from the roofs of the buildings during a whole month, although there was no rain, the water was simply the dew collected. So remarkable was the effect that my foreman came and said, "There is a "hole in the tank and water is coming in," but the fact was that the water was coming off the roof into the tank.

8774. (*Chairman.*) After the very dry weather of last summer, was not the dew in autumn very much heavier than ordinarily?—It was wonderfully so.

8775. Seeing that drainage must be extended, and that the object of drainers is to take the rainfall off as rapidly as possible, and thus to increase the floods, this short extract from one of your papers is what you would recommend to be done. "It becomes the duty of the "country to provide for sudden floods by improving "the outfalls, and dealing with the rivers systematically "from the seaboard to their source?"—Yes; and I will take the opportunity of adding that I think it is incumbent upon those in authority in this country to consider whether the landowners should continue unacquainted with the effect of putting a multiplicity of drains into free soils to discharge the water precipitately into the rivers, when by the use of more discretion they might not only do themselves good at less cost but create a perennial supply to our rivers.

8776. In fact, if care is not taken, Mr. Clutterbuck's apprehension that the drainage of the upper parts of the Thames valley must diminish the summer flow, might have some foundation?—Yes, it might, particularly if the area of the wet free soils is larger than that of the clays, and this would be an evil of great national importance, increased by the fact that drainage properly conducted is capable of augmenting the flow.

The witness withdrew.

Mr. William Needham (of the Phœnix Ironworks, Vauxhall) examined.

Mr. W. Needham.

8777. (*Chairman.*) I believe you wish to bring before the Commission an explanation of a patent you have taken out for clarifying the water that is now sent away from paper manufactories?—Yes, but the patent goes further than that. The machine has for its object the detention of substances held in suspension and the clarifying of fluids; it has been applied to a number of trades, particularly to those of brewing and paper making; there are a number of other semi-fluids now going down the river that could be equally detained by this principle if the parties would either use the machine themselves or permit us to use it for them.

8778. Would the machine be efficacious with regard to refuse matter from bleachworks, brickworks, printworks, and dyeworks?—We have never tried it, but so far as arresting all substance held in suspension the machine would certainly succeed, unless the substance was so gelatinous as to close up the pores of filtration.

8779. The process of your machine is a species of filtration under great pressure, is it not?—Yes, filtration urged by pressure. This is a diagram of the machine as shown at the Exhibition (*handing in the same*).

8780. What product does the machine detain in the process of brewing?—It separates the beer from the barm. The barm thrown out in the process of fermentation carries with it a great quantity of beer. This barm is when fresh in a granular state, but if kept with the beer beyond a certain time, especially in certain weather, frets the beer, and from a granular state passes into a gelatinous state; after that no person can effect a separation, because that which was in suspension has come into solution. But while the barm is still granular we by this process of filtration separate from it the beer, and the barm comes from the press in a state of powder.

8781. What does the machine separate in paper

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making ?—The pulp from the water. These are pulp waters (*handing in two bottles containing the same*), and this is the pulp water as it comes from the paper making machine, and this is the same water after it has passed through our machine. I have obtained these specimens from Mr. Joynson's manufactory. Mr. Joynson is a large paper maker at St. Mary Cray. We take all his pulp waters and pass them through these machines with 4,000 feet area of drainage surface.

8782. Is the use of your machine in the paper-making trade a profitable speculation ?—I believe it cost Mr. Joynson 1,500*l.*, in round numbers, to lay down these machines, and I think that he is clearing something like 15 cwt. of pulp per week, which may be valued at something like 25*l.* or 30*l.*

8783. When the pulp comes from your machine in this state it can be put back and worked up again, and sent through the paper machine ?—Yes ; Messrs. Pirie and Sons, of Aberdeen, Messrs. Cowans, of Valley Field, near Edinburgh, use our machines. Messrs. Toogood, near Cambridge, and Messrs. Hollingsworth, near Maidstone, allow their pulp water to go down the river, and they neither detain it themselves nor permit us to detain it for them.

8784. Does your process entirely do away with the very objectionable matters that come from a paper mill ?—All that is held in suspension ; the machine would not detain the chemicals.

8785. It would not detain the lime and the acids ?—No.

8786. (*Mr. Harrison.*) Neither the soda nor the lime ?—No, but many things which they may use with the pulp that are in suspension.

8787. If the acids and the lime are so much in excess as to be injurious in the river, some other means of dealing with those substances must be superadded to your machine ?—Yes, that is so. I think it is right also to mention that this machine is not applicable to all paper, it is only applicable to paper that is sized after it is formed. In the manufacture of some paper there are used gelatinous matter, rosin and other materials with the pulp, which, if attempted to be filtered, close up the meshes of the cloth, and defy all pressure.

8788. The result is a species of papier maché or impervious cloth ?—Yes, and the greater the pressure you put upon it the more hermetically you seal the cloth. In the process of distillation, I might add, a large quantity of refuse now goes into the river which could be detained by this process. In making alcohol from grain distillers have what they call their spent wash ; much of this they can sell, but a very large bulk of it they cannot, and that goes down the river, but the solid materials it contains could be detained by this process. My object is not so much to show what useful products can be saved, but how much refuse can be stopped from going into the river.

8789. To what other trades would your invention be applicable so as to prevent the refuse from going into the river ?—We have never gone round, and there is very considerable difficulty in getting on with any patent, or to get anybody to allow trial to be made, and we have not been seeking business. I was told that, on public grounds, I ought to seek this interview.

8790. Is your invention used by potters to any advantage ?—Very much so.

8791. It pays them to use it ?—Very much so, Even now, in the teeth of the enormous price of cotton. When we commenced our cloths were 1*s.* 11*d.* each ; they are now 8*s.* a piece, and we use for potters perhaps 500 or 600 cloths, and yet it is worth their while to use the invention, because the clay that we produce by pressure is so superior to that which is produced by evaporation.

8792. Can they use that recovered clay for the very finest processes known in pottery ?—That I cannot say, but it improves the quality of the clay. Potter's clay is a mixture of various substances, brought into juxtaposition by water, and then the water has to be got away in order to bring the clay into a plastic state. For this purpose, before our method was introduced, the potters resorted to evaporation. By our method the same result is obtained by pressure ; but the difference between our clay and theirs is extraordinary ; ours you cannot break if you roll it, but theirs breaks off as short as a stick ; and that difference is of the utmost consequence in passing through the fire, and also secures a closer texture better capable of bearing a print or decoration upon the surface.

8793. At the present time your machine is used beneficially in pottery for brewing and paper making ?—Yes, and by refiners.

8794. Do distillers use it all ?—Messrs. Curries put up a machinery on a large scale, and abandoned it because they found a difficulty in obtaining a sufficient price for the substance which they detained.

8795. The process was not remunerative to them ?—No.

8796. If the state of the river below them had been complained of, this invention would have enabled them to remove the cause of complaint ?—Precisely. If they had been compelled to have worked it, a market would have been discovered for it. They would have found a way to make it profitable.

8797. For what other trades do you think the process might be useful ?—I should say that every manufacturer throughout the country, refuse of whose works consists of semifluids, ought to permit us to try whether we can detain the refuse or not. If we can, in many cases, I should say that in nine cases out of ten, the cost of detaining the solid matter could be recovered from the value of the substance detained.

8798. Take dyeworks, for example ; you would have no hesitation in saying that you could detain all the spent madder, and all the spent logwood, and all the spent material that was not gelatinous ?—Yes, all that is in suspension ; and at a cost that would astonish you ; because we are doing this now at potteries under high pressure of 100 lbs. upon an inch, and producing their clay at 3*s.* 6*d.* a ton ; and clay is the most difficult body we have to deal with.

8799. (*Mr. Harrison.*) Is the pressure hydraulic pressure ?—Yes.

8800. (*Chairman.*) Would your machine detain such material as soapsuds and refuse from washing establishments ?—Yes, whatever was, or could be reduced to be, in suspension. Some parties set up a paper mill in Lincolnshire, to make paper from couch grass and from straw. They used chemicals for pulping those materials, and after they had pulped them they let the chemicals down the river with a certain quantity of matter that had come out either of the grass or the straw, and they were threatened with an action for it : but hearing of our invention they came to us, and asked us if we could do any good for them. We said, "we cannot tell, but if you will send us a barrel of the stuff we will try it." They sent it, and we tried to detain the matter in it, and at first we found that we could not because the great bulk of it was in solution ; but soon we found that by putting a very small quantity of sulphuric acid into it, the matter it contained instantaneously turned into suspension. We then passed the liquid through the machine, and brought the water away clear and detained the substance.

8801. Was the water coloured previously ?—It was black, and the smell was horrible. We made the water quite clear. The result was that the parties were exceedingly delighted ; they went away, and we never saw them from that day to this.

8802. You are not aware of the extent to which the application of your invention may be carried ?—I am not, but I think it is unlimited ; and to show how completely we can do these things, we have had stuff sent from India, lac dyes. With them we did in a few hours what it used to take six weeks to accomplish, viz., separate the water from the dye. However, this application of the scheme broke down commercially, because we could not get the matter into the form required by the market, not that we could not detain it.

8803. If in Yorkshire and Lancashire there are

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enormous bleach works, print and dye works, which contaminate the rivers by pouring into them wholesale every form of refuse, your experience would lead you to infer that very great improvements might be made by the use of your machine, although it might not remedy everything?—Yes, and I should only be too glad to enter the field *con amore.* A machine contains 600 feet area of drainage surface.

8804. What pressure do you apply upon a square inch?—In a brewery about 50 lbs., in a pottery 100 lbs. Oil works about 50 lbs. or 60 lbs.

8805–6. What pressure could you go to?—We could make a machine with a pressure of 100 lbs. on a square inch.

8807–8. What would the straining-cloths bear?—They are supported by the machine, but if the Commissioners would do us the favour to inspect the machines which are at work at Messrs. Joynson's paper mill, I think that would convince their minds far more than any words of mine. The larger the operation the smaller would be the cost of working.

The witness withdrew.

Adjourned till to-morrow at 11 o'clock.

Victoria Street, Wednesday, 24th January 1866.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

Mr. FREDERICK KING examined.

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8809. (*Chairman.*) What are you?—A land surveyor, at Pope's Head Alley, Cornhill. I practise in London.

8810. You are acquainted with the Thames?—I am; more particularly with the district between Sandford and Lechlade.

8811. From what period have you known that district?—For 40 years. From 1818 to 1838 I lived with my father, who was steward to Lord Abingdon, and I lived in Oxford 20 years subsequently. I know also the tributaries, the Windrush, the Cherwell, and the Evenlode.

8812. All those contribute to the flooding of Oxford?—Yes.

8813. In what condition was the river when you first knew it between Sandford and Lechlade?—It was used regularly as a navigable stream for barges of large tonnage; in fact, the traffic of the west of England with London was mainly all carried on by the river.

8814. That, to a great extent, has been superseded by railways?—I may say entirely so as to direct communication.

8815. The river has fallen into comparative disrepair?—The river has been greatly abused, and has fallen into the condition of a gigantic sewer.

8816. Is the land on either side in that part of the Thames liable to be flooded?—To a great extent. I once made a calculation that some 22,000 acres of land above Sandford were subject to floods.

8817. Upon the Thames proper?—Yes. I am sure I did not take in the Windrush and the Evenlode, but I think I did take in a part of the Cherwell in the immediate neighbourhood of Oxford.

8818. Did you take the Thames up to Cricklade?—As far as Radcot only, that is below Lechlade.

8819. Have you been called upon to execute any works to prevent the flooding of that part of the Thames?—I have been engaged as a valuer for the enclosure of several tracts of meadow land in these districts; they have never been properly drained from want of a proper outfall.

8820. What would your valuation of land in those districts be now, as compared with what it might be if there was a proper outfall and proper drainage?—I do not hesitate to say that land now worth 1*l.* an acre would be worth 3*l.* an acre if properly drained.

8821. And not subject to flooding as it is now?—Not subject to the stagnant water.

8122. Have you carried out any drainage works?—Not to my satisfaction for want of a proper outfall.

8823. Do you know of any works that have been executed in the neighbourhood of Bampton?—Yes, I have been a party to a great portion of them. The first inclosure of a district there was made by me, and that was afterwards followed by the inclosure of another large district, and those works have been successful to a great extent, but not entirely so.

8824. What has prevented them from being entirely successful?—The blocking up of the water by obstructions in the Thames.

8825. What remedy do you suggest as applicable to the mischief?—The main cause of the evil is this, that the river which receives the drainage of the land, in an agricultural sense, has locks and weirs. If there is one of these immediately below the point where the drainage of a large district, either right or left, comes in there is no outfall. Years ago, when the locks, or pounds, or weirs, were closed for navigation purposes, the effect was, even in the driest summer, to submerge a large district, instead of simply filling the reach of the Thames for the barges. If the inlet of the stream draining the land were put below the lock or the weir instead of above the effect would be very different.

8826. Can you refer to an instance where there is a lock situated immediately below the junction of a tributary?—Yes; Bushey weir and Old Man's weir near Bampton; also Iffley lock below the junction of the Cherwell. As a rule, all through the Thames, the principle was to place the pounds or locks immediately below the tributary stream.

8827. And flooding of the land was the consequence?—Yes, unnecessary flooding at every flash.

8828. What remedy would you suggest for the present condition of the Thames?—What I have stated before the Institute of Civil Engineers:—"The "improvement of our navigable valleys is a national "question, a question of food for our cattle, consequently food for our people, and can only be secured by application of parliamentary powers, the "preliminaries of which, in my opinion, are briefly as "follows: to form the valley into an elective drainage district or districts, the *modus operandi* being "as follows. One-tenth of the proprietors of any area "requiring a combined system of drainage, may apply "to the Inclosure Commissioners to constitute such "land into a separate elective drainage district, with "a saving clause as to the consent of existing commissioners of sewers, town councils, local boards "of health, or improvement commissioners. Upon "receiving this petition the commissioners will ap-

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" point an inspector to make local inquiry as to the " genuineness of the signatures and propriety of the " boundaries of the areas proposed to be drained; " but in the event of the proprietors of one-third of " the land comprised within the area dissenting, " within a given time, the commissioners are to dis- " miss the petition. The signatures of one-tenth " will secure the appointment of an inspector, and " no one, I think, will ever be able to get the signa- " tures of one-third of the proprietors against it. " Assuming they cannot do this, the only subsequent " difficulty will be to procure the consent of two- " thirds in value, which secures the formation of an " elective drainage district, and accomplishes all that " can be desired. The area I propose to deal with " will be the alluvium strata of the whole valley as " laid down on the geological maps of the Ordnance " survey, or what perhaps is better, the line of high " flood level," that is, that the line of deviation should be the present line of flood level, and all lands within that should be rated for the purpose.

8829. Is that the limit of the benefit that would arise?—Not entirely; no doubt an outfall would be made for the drainage of a great deal of land beyond that limit.

8830. Have you carried out drainage works to any extent?—I have drained several hundred acres of meadows, but I have never been able yet to get a proper outfall for them.

8831. Is it not one of the effects of drainage that clay lands send down floods more rapidly into the river?—No doubt of it, particularly where the drains are put in shallow: when drains are put 4 feet deep the slow percolation prevents the water going down rapidly.

8832. Does not that more rapid flood make it necessary to improve the means of passing off floods?—Unquestionably; at the same time it is to be remembered that floods should not be kept off the land altogether; vegetation is not injured by water unless it becomes stagnant.

8833. May not lands, drained, it may be, miles away from the Thames itself, cause necessity for an improvement of the Thames, and therefore should they not contribute a portion of the cost of that improvement?—Much stress should not be laid upon that, because we have no evidence to show that floods are greater now than they were many years ago.

8834. Floods come down more rapidly, but they are not larger?—No.

8835. (*Professor Way.*) I understood you to say that you see great difficulty in making any other boundary except that of the flood level?—I think it would complicate the question; the area to be rated should be the area liable to be flooded. Although it is true that parties outside high flood level would be somewhat benefited, yet I think it would be unwise for Parliament to press the point. I know of no limit better than the flood-line of deviation.

8836. That is an obvious limit which no one could deny?—No, there is no question about it.

8837. (*Mr. Harrison.*) Have you observed the floods immediately in the neighbourhood of Oxford, between Wytham and Sandford?—Yes.

8838. Have you paid particular attention to them?—Yes, for 40 years, and I wrote upon the subject more than 20 years ago.

8839. At Wytham the Thames is divided, I believe, into three streams, one by Wolvercott mill, one by Wytham and Botley, and one by King's weir?—Yes.

8840. King's weir channel, I believe, is a navigable stream?—Yes.

8841. Have you observed whether the stream above King's weir has altered in depth, and in other respects?—I can speak of some 35 or 36 years ago, and I remember the millwright who was then employed by the former occupier of Wolvercott mill telling my father in my presence that he had raised the sill of Wolvercott mill and that he had raised the sill of King's weir, and in doing some repairs at Wytham mill for Lord Abingdon he said that he must raise the sill there also, that if he did not do so he should lose Mr. Swann's work; thus those three streams have been blocked up 9 inches or a foot, and in consequence barges that used to navigate the stream through King's weir were frequently lodged on the sill riding and breaking their backs.

8842. How was that occasioned?—Extensive works were being carried on in paper-making at Wolvercott mill, and Mr. Swann wished to have control over those three streams to get a greater power of water. At the same time he had many coals going to Eynsham, and he was thus enabled the better to get the coals from the Oxford canal.

8843. When was the branch made to the Oxford canal?—Before I can remember.

8844. Was the effect of raising the water at Wolvercott mills, and Wytham, and King's weir to injure the land above?—The effect of raising the water at Wolvercott mill, King's weir, and Wytham mill was to change some of the most beautiful meadows in England into marshy swamps.

8845. Is that within your recollection?—Yes; Yarnton meadow has been injured 50 per cent. and Cumnor meadow has been injured 50 per cent. I believe that Yarnton meadow belongs principally to Sir Henry Dashwood; Cumnor belongs principally to Lord Abingdon, and the Stanton Harcourt meadows belong to the Harcourt family.

8846. Captain Dashwood stated that by stopping up the back stream from the river his brother's meadows had been very much improved?—The railways may have done something, but those meadows have been materially injured within my recollection.

8847. Was Sir H. Dashwood's meadow the part that you spoke of as being flooded mischievously?—Yes.

8848. Was King's weir stream much used for navigation within your recollection?—Yes, I have seen 20 or 30 boats together at a time.

8849. Is it so used now?—I should think that about 1 a month is more than there really is.

8850. Are you aware that it is hardly possible now for a boat to go down the stream?—I should think it is very likely; I know that Lord Abingdon used to have four or five canal boats brought down to Godstow laden with coals and there was a difficulty in getting them over the sill at King's weir. I think they fetch the coals now to Wytham Abbey from the canal at Wolvercott in consequence of this difficulty.

8551. Where do you say mischievous floods are caused to the meadows near Oxford?—In Port Meadow. Above Godstow is the county boundary called Shirelake ditch, between the Godstow willow beds and Wytham meadows; that was formerly, no doubt, the main stream. I recollect when there used to be there a sluice that could be drawn up to let out the floods, but now they have put in a stone tumbling bay which keeps the water at a certain head, and prevents the floods passing down Shirelake ditch as fast as they would. Immediately below Godstow, at the top of Binsey, there was another important ditch called Swift ditch which, by its name, indicates that it ran swiftly, with a considerable fall; it used to be a good cattle boundary between the cattle of the liberty of Godstow and the cattle of Binsey. Now, excepting in flood times, it is quite dry; the stream has been obstructed, too, by a stone tumbling bay—there is no moveable sluice to relieve the water. The effect of these two alterations has been to throw the water on to Port meadow, and, as the soil is porous, to throw the entire weight of the water upon Oxford. I have known acres and acres washed away where I have played at cricket when a boy, and now there are 7 or 8 acres of additional water added to the stream.

8852. Have you been to Oxford lately?—Not for some months.

8853. Are you aware that they have formed a bank round Port meadow?—I have heard so; Mr. Gresswell is the prime mover in that. He has made a small and insufficient outfall to drain Port meadow, carrying the water to a point below Ousney pound, which is

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what I call playing with it. Such a work was entirely unnecessary in my day, for the flood waters then passed west of Oxford by way of Shirelake ditch across the meadows nearer to Botley and the tongue of the stream. I have seen the water over the turnpike-road at Botley meadow in 20 places.

8854. Do you remember when Port meadow was in the wretched condition it was in before the bank was raised?—Yes, but Port meadow was not so bad in my early days as of late—it has been made better by what Mr. Gresswell has done.

8855. (*Professor Way.*) Mr. Gresswell has put it back to the condition in which it was?—Yes, but he has had to deal with waters that formerly took another course.

8856. (*Mr. Harrison.*) If I understand you rightly obstructions have been raised to the passage of the flood water in the different channels west of Port meadow, so that water that formerly passed freely off has been for some years thrown upon Port meadow, and injured its condition?—Yes.

8857. The tumbling bays above Oxford have been put in under the direction of the Thames Commissioners?—Yes; the effect of which has been to prevent the flood waters from flowing westward, and to bring them down on Oxford with great force.

8858. Do you know how much the tumbling bays have raised the height of the water?—I do not; but a tumbling bay being a wall built across the stream of heavy stone, is a permanent and serious obstruction, whereas the tackle used to pull completely up. Passing further down to Medley lock, I remember that in summer time I could walk across the Thames there; there used to be only 18 inches or 2 feet of water there, and I have seen boys bathing where they now talk of building a bridge, at the end of the tongue of land just above Ousney lock.

8859. (*Professor Way.*) That same water I suppose, is wanted in other parts of the river?—I consider that what has been done has very much benefited Binsey and the wet districts on the Wytham side, and thrown the water more upon the Oxford side.

8860. (*Mr. Harrison.*) Have you known ballasting carried on thoughout this district by the Thames Commissioners?—Very slightly indeed; I have seen ballast barges there. Very great good might be done by a great deal of ballasting; many hundred thousands of tons of gravel might be ballasted above Oxford. Nature has placed a barrier across at Sandford, and art has added to it as well. The geological strata are such that the channel is very narrow. Mr. Swann had Sandford mill at the same time as he had Wolvercott mill, and, I have no doubt, dealt with it in the same way. I am of opinion, although I am speaking now of a long time ago, that it was a great mistake to divert the channel which used to take the flood water off at Shirelake ditch. It may have benefited the City mill and Ousney mill but it has ruined Port meadow and the lower parts of the city. Another great obstruction is at Iffley; that reach of water is kept up for the purpose of boat-racing, but the result is very injurious indeed to the lands.

8861. Is that kept higher than it used to be?—I should think not. The river has been very much grown up with mud immediately below Oxford from the sewage.

8862. Do you know the meadows by Iffley?—Yes.

8863. What condition are they in now?—The meadows by Iffley are in a very bad state; they are growing worse every year. The fine grasses are giving way to the water grasses.

8864. Have you had any experience as to the effect of meadows in that condition upon sheep?—It is scarcely safe to put sheep into such meadows. The hay is very coarse, and it is not suited for sheep. Sheep might go much nearer to the river if proper drainage was carried out.

8865. Have you made any observations as to the effect upon meadows of the height of water in the adjoining river?—Immediately below Sandford the meadows are dry, and the grass is fine, and of much better quality, so that sheep can graze at the water side.

8866. Low-water is kept several feet below the meadow?—Yes considerably below.

8867. (*Professor Way.*) According to the height of the river will be the height of the water on the land. Where it is gravel what is the best height at which the water should be kept?—I should wish to keep the water low, but at the same time I should not wish to stop the flood water from passing over the land. I want to have a control over the water. It is stagnant water that does the mischief.

8868. (*Mr. Harrison.*) If you had the water of the Thames under control throughout this district would you apply that water to irrigate the land?—Yes.

8869. Do you think that the meadows above Oxford might be converted into useful water meadows? I am not in favor of artificial water meadows below flood level. Natural irrigation I am in favour of below flood level. The silt and deposit is so great from every flood that it makes the expense of maintaining water meadows very great, and the plan does not answer. Then there are many obstructions caused by the old fishing apparatuses, which have been kept up as a kind of vested right, but they yield scarcely any profit. Sometimes during seven years perhaps they do not catch 7*l.* worth of fish, and then perhaps they may in a night catch half a ton of eels. I believe it would not require a very large sum to compensate them all.

8870. (*Professor Way.*) There are two kinds of fishing; fish are caught to be eaten, and fish are caught as an article of sport; should we be right in supposing that the persons who are most tenacious are the anglers?—No, the most tenacious people are those who send their fish to Greenwich and such places.

8871. (*Mr. Harrison.*) Do you know anything of the process of catching eels?—Yes, and I have heard of half a ton weight being caught in a night.

8872. Is it not possible to catch eels without obstructing the river?—I should think so, but I have known, for the sake of a few fish, hundreds of acres of land submerged in hay-making time, when the meadows would otherwise have been dry.

8873. (*Professor Way.*) What comparison should you make between the value of the fish caught and of the hay destroyed?—I can tell you what perhaps will startle you. I have seen 20 and 30 men employed to catch hay floating down the river, and take it out on to dry land. I remember seeing a fisherman in a great rage with a farmer who came down to one of these places to claim his hay. The fisherman said, "If you can identify the hay you are welcome to it, "but otherwise you shall not touch it." This was 20 years ago. I myself sold by auction a rick of hay belonging to a man who had not a bit of land, but who had collected it from the river. It brought, I think, about 37*l.*

8874. (*Mr. Harrison.*) Have you known floods occasioned by flashes?—I have seen water amongst the hay occasioned both by flashes and being shut in for fishing and boating purposes. But the most important thing is to let the land drain immediately below the obstruction, whatever it is. I believe that a good trade would yet come to the Thames, even as against railways, if the water was confined to the Thames proper, as in a canal, stop all the streams flowing now directly into the river above an obstruction, and bring them in below the obstruction.

8875. Of your personal knowledge you can say that the weirs and tumbling bays upon the Thames in the neighbourhood of and above Oxford have been tampered with within your recollection, so as to cause considerable injury to the adjoining lands?—Yes.

8876. And your view is that the management of the river and control over those weirs and tumbling bays should be in the hands of somebody who should not have any local interest for interfering with them?

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—Exactly so. I think that the river should be under the control of some public board without reference to town, party, or an individual.

8877. (*Professor Way.*) Do you know any land in the neighbourhood of Oxford available for the application of the sewage of the city? — There would be no difficulty in distributing a large quantity of sewage on the meadows between Oxford and Sandford; but I think sewage is more calculated to improve marshes like the Essex marshes than to manure meadows which are already good.

8878. Is there any land in the uplands that would be benefited by it?—There is plenty of sandy land in different places, but it would require expensive apparatus to pump the sewage to it.

The witness withdrew.

Rev. H. Moule.

The Rev. HENRY MOULE (of Fordington, Dorset) examined.

8879. (*Chairman.*) You have some facts to lay before the Commissioners as to a new kind of closet adapted for use in dwellings?—Yes, upon what I call "the dry earth system." This system of removing smell and soil by means of earth, is by far the most effectual means of preventing pollution of rivers, and I believe the only means.

8880. You are aware that rivers and streams are now very badly polluted by sewage matter?—Yes; when my attention was first drawn to the deodorization of sewage and the deodorizing power of earth, the question of the Thames was at the same time before the public, and I then went very carefully into the matter, as I have also done since. I first thought that it was almost impossible to apply the dry earth system to a town, but I am now convinced that it is perfectly feasible, and that it will prevent contamination of air and water more effectually than the water system.

8881. What is the first cost of one of these contrivances?—The machinery alone costs 25*s.* I mean the iron hopper that throws the earth from the reservoir at the back on to the deposit. In the county school at Dorchester, where there are 70 boys, they have just been compelled to give up the application of water; and a vault, 10 feet by 6 feet, and 5 feet deep, paved and lined with brick, with four closets and a urinal for that number of boys, has cost 18*l.*

8882. Do you use dry earth to disinfect the urine as well as the fæces?—Yes.

8883. For instance the urinals at railway stations?—Yes. In my own parish school there are 70 boys, and I have a complete arrangement for urinal as well as closet. A farmer undertakes to supply the earth and to remove it, and he gives me 10*s.* a month for the produce; there is no offensive smell.

8884. That would be 6*l.* a year?—Yes, the soil is thus sold at a sum far below its value, but still the return is something. When a system is making its way you cannot get anything like a right value for it.

8885. (*Chairman.*) What quantity of earth in weight is requisite for a single closet, and for what time?—I find, after careful observation, that 4lbs. of dry earth per head are sufficient for 24 hours for each occupant of a house.

8886. If there were 12 occupants you would require 48lbs. of earth per day?—Yes, take it thus: 4lbs. of earth per day for each individual would make half a cwt. for a fortnight, or for an ordinary family of five persons, 2½ cwt. for a fortnight, or a ton for 16 weeks, and the earth after having been used may remain in a vault the whole of those 16 weeks, without any offensive smell whatever. The power of repeated action in the earth is one most important feature in this system—the earth after remaining for four months in a vault, and having been taken away and dried, may be used again; so that you would have to cart into a town not 3 tons but only 1 ton a year for 5 individuals.

8887. (*Professor Way.*) How did you dry the earth?—During the greater part of the year by natural heat; occasionally and under some circumstances artificial heat is required. This plan is now being carried out by Mr. Garnet at Lancaster in a way that I have recommended to him. He has commenced cleansing Lancaster on the earth system since October last. He has a shed 80 feet by 30, and he has appropriated a square of 30 feet to this artificial heat. The whole of the smoke is sent under a floor of brick or of stone—there are ridges in it and the heat is radiated into the room. Mr. Garnet will thus be able to dry several tons a day with ½ a cwt. of coal.

8888. (*Mr. Harrison.*) Is there no offensive smell in the drying?—None whatever, if the earth and the soil have been intimately mixed. I had some refuse taken out of my closet after being so mixed and put into an oven, and there was no smell. The more I look at this part of the matter the more I am astonished at it.

8889. (*Chairman.*) It would require for London nearly 3,000,000 of tons of earth per annum?—Yes, if fresh earth were always used but you may use the same earth 5 times over.

8890. But in using it over again there would be no profit from the soil?—In Sheffield the corn dealers and manure dealers are thinking of establishing a company to take the soil, and they expect to make a considerable profit by it.

8891. If you dry the earth which has been used for the first 16 weeks, and put it back to perform the same service as before, you gain no valuable manure by the process?—No, if you dry the soil above a certain heat; but if you dry under the heat of boiling water, you lose nothing.

8892. The manurial value remains in the freshly dried earth, and it is fit for use again?—Yes. I can give you two experiments upon rather a large scale which quite satisfied me on the subject. Five years ago, an intelligent farmer came and asked me to let him try an experiment. I gave him 1 cwt. of the soil that had passed through my closet five times after being repeatedly dried. He was sowing with swedes, four acres; and he applied this 1 cwt. of soil to one-fourth of an acre, and to three acres and three quarters he applied 15 cwt. of superphosphate of lime, and the swedes on the quarter of an acre weighed one-third more than on any other quarter acre in the field. In the other case, on a field of 4 acres sown with turnips 1 cwt. per acre was substituted for crushed bones, and two experienced farmers said that a finer crop had never been seen.

8893. The first arrangement of the closet; that is to say, the filling in with soil, requires the intervention of a servant?—Yes; or in the case of a town, the servants of a company.

8894. Then the soil has to be carted in for use, and the expended soil carted out?—Yes.

8895. If the drying process is to take place, would you recommend it to be carried on in each household, or to be part of a general arrangement?—Certainly in a town to be part of a more general arrangement, as is the case now at Lancaster.

8896. Does any dust arise from the use of the soil?—No, if ashes are not mixed with it; but a very small proportion of ashes, perhaps one-third, would not be objectionable.

8897. Is there any more room taken up by this form of closet than by the ordinary one?—Less room, unless you have it upstairs, for since the descending pipe or shaft must be perpendicular, and 12 or 15 inches in diameter more space must be occupied by it than by a waterpipe in the rooms below, or there must be a projection from the house. But that shaft may have a bottom to it, and be itself the vault; and the emptying of this shaft, which I believe Mr. Garnet is now carrying out at the gaol at Lancaster, is the affair of two or three minutes. You have just to move the bottom on a slide or a hinge.

8898. Is Mr. Garnet carrying out the earth system

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in any cottages and courts of Lancaster, or simply in the gaol?—He began with the cottages, but one of his first places was a foundry, where there were 150 men employed. He applies the system without the intervention of the hopper. A box of earth is placed at the side of an ordinary privy, and the people are recommended to put in a scoopfull of earth each time. In the gaol at Lancaster there is a pan for use in each cell, and Mr. Garnet has persuaded the magistrates to let him have a box of earth placed by the side of it. All offensive smell is thus prevented, and in the morning the men will carry the soil to one of the descending shafts, and throw it down.

8899. Dry earth is used in this way in India?—Throughout the whole of India since 1863. Dr. Mowatt, Inspector General of Gaols in Bengal brought before the Supreme Council the paper which I read before the Society of Arts, and the method was adopted. The Sanitary Commission in Calcutta reprinted the paper, and sent it to every station in the Punjaub. The Local Government of the Punjaub then had it translated into Punjaubee, and Dr. De Renzy, medical officer in charge at Mooltan, addressed to Mr. Talbot the resident civilian there a communication on the subject, which has been forwarded to me. It contains the following passage:—" The use of earth as a " deodorant was altogether unknown here before the " publication of Mr. Moule's paper. Earth and ashes " were used in the latrines as absorbents of moisture, " not as deodorants. The earth sewage system has " been of immense use in this gaol. The barracks, " which formerly used to be disgustingly filthy from " the smell of urine and fœcal matter of 80 or 90 " convicts at night, are now perfectly sweet. I have " frequently visited the gaol at night for the purpose " of ascertaining this point. Nothing could be more " perfect than the success of the system. Mr. Moule " is, in my opinion, entitled to the entire credit of the " discovery of the earth sewage system. And I am " so strongly impressed with the advantages of the " system that I gladly bear my testimony in his favor. " In military cantonments, gaols, and native cities, the " system will be invaluable. Before the adoption of " the earth system, the removal of excreta from the " gaol caused a most offensive smell to pervade the " premises. At the present moment no smell what- " ever is perceptible from the wards at a distance " of 18 inches."

8900. (*Professor Way.*) Have you received any acknowledgment of the fact that in India the arrangement is carried out after your plan?—Yes. Dr. Mowatt in his Report to the Sanitary Committee or the Supreme Council states that the sole and exclusive merit of the introduction of this system into the whole of British India is due to me, and with reference to the plan that had been previously in use in the Punjaub, he says that it had no resemblance to my system. I have also received some curious information from China. Jesuit missionaries had stated that the use of earth had been practised in China from time immemorial. I then took pains to inquire how far it was the practice still. I have two sons who are missionaries in the north of China. I have received communications from them, and from a number of others, and they can find no trace there whatever of the dry earth system. A Chinaman seems to have no sense of smell, and carries about ordure in the most barefaced way. However, the other day a nephew of mine came home from Hong Kong, having been 300 miles into the province, and he sent me back my handbill upon the use of earth, with a message that he was sorry to detract from the originality of my invention, but it had been in use, at least in South China, from time immemorial. " I myself saw," he said, " at least 10,000 " tons of ordure mixed with earth under the walls of a " city in China waiting for shipment. They are in " the habit of shipping it in lighters to take to farms " up the river, and this has been the case from time " immemorial." I will read, if you please, an extract from the letter of Sir John Lawrence's private secretary, dated Simla, August 5th, 1865. It is part of correspondence that originated with an application on my part to the Governor General for some compensation for the service which it was plain I had rendered to India. " But there is no question " that the general use of dry earth has only recently " come into operation as an experimental measure " upon the recommendation of the Bengal Sanitary " Committee; and since your paper, when brought to " their notice, may lay claim to having suggested " their action, you may hereafter, if the result be " reported upon satisfactorily, ask for what at present " seems premature. This, however, I must observe, " is only my personal view of the matter, and in no " way commits his Excellency the Viceroy and " Governor General of India. But as the dry earth " system is as beneficial in England as in India, why " should you not move the Home Government to " recognize your services?" He thus admits the general introduction of it into India, and I know that in all the gaols it has been introduced. And in a previous letter he had said that the Viceroy was duly sensible of the service I had rendered by my paper on earth sewage.

8901. I believe you have also been in communication with Miss Nightingale with reference to some of the home hospitals?—Yes.

8902. Is the earth closet in use in any of our great hospitals in England?—No; but the prevention of offensive smells in sick rooms and in the wards of hospitals is so complete by it that I think it soon must be.

8903. What would an apparatus cost like the one you have produced?—Messrs White & Co., the manufacturers, would supply such an one for 3*l.* 10*s.* 0*d.* with a seat fitted. (*The mechanism of the earth-closets was explained to the Commissioners.*)

8904. (*Mr. Harrison.*) Have you any information to give as to the additional weight acquired by the earth after having been used a certain number of times?—If it is removed immediately of course there is the weight of the liquid, but a great deal of the liquid evaporates when it remains in the vault. Mr. Gee, the vice-chairman of the board of guardians at Bradford, in Wilts, who has adopted the system in the school of the Union Workhouse, says that at the end, I think of 5 months, he found scarcely any perceptible difference in weight—there were 2 tons from 57 children—he sold it to the farmers for 2*l.* a ton.

8905. In the case of cottages in small towns, where gardens are generally attached, there could be no possible objection to the adoption of the plan from the necessity of cartage?—No.

8906. The cases in which objections might be raised to it would be densely populated towns where the soil would have to be carted in and the manure carted out from time to time?—Yes; but this if a company be formed would be a trifling difficulty.

8907. Have any experiments been made as to the effect of this manure upon cultivation?—Yes.

8908. Is it to be compared with the effect of town sewage?—Yes. But I would with your permission, revert to the question asked me as to the quantity of earth that would be required for London. If you will bear in mind my statement with respect to the quantity of earth required for a family of 5 persons, you will see that the introduction of earth into the house would for each person be no more than the introduction of 3 tons of coals in a year.

8909. But you have 5,000,000 or 6,000,000 tons of coal coming to London in a year?—Yes; but the removal might be effected in any town by the persons who at present remove the ashes. It is in that way that Mr. Garnet, at Lancaster will act; a staff increased a little will easily remove all.

8910. All over the west end of London ashes are removed by dust-carts, and you think that they could remove the soil from the earth-closet after bringing in the new soil?—Yes. At Weymouth I understand they are in great difficulty as to sewage. I showed an architect my plan of a descending shaft, and he considered it perfectly applicable. At the school there

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the stench was such that I could not stand within many yards of it, and how the children lived I cannot understand.

8911. (*Mr. Harrison.*) What would be the expense of carrying out your system as compared with sewering a town?—It would not be above one-third of the expense, because you would have no public works whatever—private works are far less expensive.

8912. (*Chairman.*) Have you induced the Dorchester people to adopt your system?—We have just got it into our county school.

8913. Is it used in any private houses?—Yes, in several; and in Weymouth too.

8914. Have they not recently drained the town, and substituted water-closets for privies?—Yes; and in the county school water-closets and a urinal flushed with water had been erected. But in consequence of the scarlet fever having been twice there, and the offensiveness of the urinal (which water can never prevent) being perceived across the yard in the dining-room, the council have cut off the water and adopted this plan of mine.

8915. I was referring to the town council of Weymouth?—They have not adopted the earth system, but they are now in difficulties that will soon, I think, compel them to do something of the kind. I have very little doubt that in a few years they will adopt it, for what they have done has been so miserably carried out.

8916. In Sheffield has it been adopted by the town council or by individuals?—Some of the members of the town council are combining with men of business in getting up a company. Several of them have tried it; one gentleman is a large householder, and another told me that he and the clergyman of his parish and several others were carrying on the system most successfully.

8917. (*Professor Way.*) Is it not the fact that the limit to which the earth will serve for further use is determined by the quantity of liquid and excrement that has been mixed up with it during previous use?—Yes, I should think so.

8918. When you say that you use the earth five times over, that merely means that the manure having been perfectly mixed with the soil there still remains an excess of soil fit to absorb a further quantity of liquid?—So it would seem; and yet I have found the contents of an old cesspool when dried deodorize as well as ordinary earth.

8919. Where earth is abundant you would not require to use it over again, and you rather look to such further repeated use as a means of reducing the labour of carrying earth in and out of a town?—Yes, and also as a means of increasing the value of the manure and its easier transport; in my garden I use fresh earth every time.

8920. Is the calculation of 3 tons for 5 persons per annum based upon the supposition that the application is repeated or that fresh earth is used each time?—3 tons would imply fresh earth being brought each time; but if you used the earth 3 times you would not want more than 1 ton. For the town of Weymouth I gave an estimate some time ago showing that they would not want more than 5,000 tons a year. I may mention that I have been told by an engineer officer who under orders from the War Office carried on experiments at Portland, that he found the blue Oxford clay more effectual in deodorizing than the rich soil of Portland.

8921. In large public works the probability is that your apparatus would not be used?—No, but earth alone might be used, and one great requisite is the regular application of small quantities.

8922. For private purposes it is clear that some self-acting arrangement should be adopted?—Yes.

8923. And probably you would look to private houses as the first in which to bring it into operation?—Yes; but I think the advantage of it in sick rooms and wards of hospitals would be found very great indeed.

8924. Your object has been to spread a minimum quantity of earth in an effectual way over the excrement each time?—Yes.

The witness withdrew.

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STEPHEN WILLIAM LEACH, Esq., (Engineer to the Thames Conservancy Board,) examined.

8925. (*Chairman.*) You gave evidence before the Select Committee last Session?—Yes.

8926. May we take it that the evidence you then gave represents your present opinions on the same points?—Yes, except in one respect. I stated then that I thought it not of much importance to the supply of water to the companies that the weirs should be maintained. I said that I thought the water would find its way down. I think, however, that it would be an advantage that the water should be arrested by those weirs, and that ponds should be formed.

8927. Do you think that any similar improvement of the upper Thames, or any of the Thames tributaries, would in the same degree be an advantage to the great water companies now using the Thames water?—I think it would.

8928. And works for purifying the water, and preventing sewage or noxious matter flowing into the Thames, would also be a benefit to the water companies?—Decidedly.

8929. For any works of that character tending to equalize the flow of the water to increase the minimum volume, and to purify the water, do you think one might fairly look to the companies to contribute some portion of the expense in the shape of an annual rentcharge for the water taken?—I think so.

8930. Do you know what sum is paid to the River Lea Commissioners by the East London Company for abstracting water from the Lea?—I believe 2,000*l.* a year. The New River Company and the East London Company together, pay upwards of 5,000*l.* a year.

8931. There are five companies now abstracting water from the Thames above Teddington lock?—Yes.

8932. If a rentcharge of 1,000*l.* was placed upon each of the five companies taking water from the Thames, that would produce 5,000*l.* a year?—Yes.

8933. Representing, at five per cent. 100,000*l.*?—Yes.

8934. Do you know sufficient of the upper part of the Thames to be able to form any idea as to what could be done in the way of repairs with 100,000*l.*?—It would go a very considerable way towards reinstating the navigation. I made a rough estimate for the Board of Trade some time ago, and I put the lowest estimate at about 112,000*l.*

8935. If you got the money at three and a half per cent., an income of 5,000*l.* a year would more than pay the interest of the sum you have named?—It would.

8936. Have you any analagous charges in the lower reaches of the river?—The five water companies which take water from that part of the river pay a sum annually to the Conservators, but that sum was fixed to repay the Corporation of London for the cost of works that were considered necessary to put the river in a fit state to allow that quantity of water to be taken from it.

8937. Do you see any impracticability, if you had a staff of workmen placed at your disposal, in preventing dead animals from floating on the river until they became putrid?—No.

8938. Might they not be taken out and buried at no very extravagant cost?—Yes.

8939. You know that at the present time no such work is done?—No; it is done in our part of the river, not systematically, but occasionally. I have had hundreds of dead dogs buried.

8940. Would it be reasonable to have the same

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thing done throughout the whole length of the Thames where the water is used either for ornamental purposes or for water supply?—Yes, I think that the companies might fairly demand such a thing as that to be done, supposing that a rentcharge was imposed upon them.

8941. Might not the companies also say to Parliament, "Give us a guarantee that pumping the undi-" luted sewage of the towns and villages upon the "banks of the river shall not pass directly into it"? —Yes.

8942. Supposing the whole valley of the Thames to be placed under one board, do you see any difficulty in one engineering head exercising authority over the whole, and having resident sub-engineers acting under him?—Not the least.

8943. Would not the river be more economically managed in that way than by separate boards?—It would be more advantageously managed. Uniform management is, I think, very desirable.

8944. Is there any objection to increasing the present Conservancy Board by adding representatives of property situate on the upper Thames?—Any evidence I may give upon that point I must ask to be taken as simply my own opinion, and not as the opinion of the Conservators. I think it would be very reasonable that the local interest should be represented.

8945. I suppose you would not recommend a very large board?—No.

8946. Your experience, I suppose, tells you that large boards are not so efficient as compact small ones?—Yes.

8947. There is a difficulty in getting a number together for general business?—Yes, after all, the work is devolved upon a few, except that upon occasions of elections many come forward.

8948. Overwhelming the few who have given all their attention to the business?—Yes.

8949. Have you any idea what amount of dredging has taken place in the lower reaches, from Richmond downwards, within the last 20 years?—No record has been kept, but the total quantity must have been enormous.

8950. What effect is the dredging supposed to have had upon the low-water level of Richmond?—I have here some observations taken in the years 1820, 1822, and 1823, with reference to the removal of London Bridge, which will throw light upon that point.

8951. When was that bridge finally removed?—The new bridge was opened in 1831 and these observations in the year 1822 were taken in the month of August. Trinity high-water mark was called the zero, and it was found that the extreme fall of the tide at Richmond Bridge, an exceptional one, was 6 feet 3 below zero; the ordinary fall varied from 5 feet 9 to 5 feet 11, whereas on the 17th of August 1859, the tide fell 7 feet 3 inches below Trinity high-water at Richmond Bridge.

8952. A foot difference?—The tide was 1 foot 4 inches lower in 1859 than in 1832.

8953. (*Professor Way.*) Was any record kept of the winds at that time?—No.

8354. (*Chairman.*) Would you be surprised to hear that in the last summer the tide has been 3 feet lower than the low-water mark figured upon the elevation of Richmond Bridge?—It would depend entirely upon what that low-water mark was.

8955. It was the lowest water mark at the time the bridge was constructed. Last summer the Thames at Richmond was so low that a boy could have walked across and the water would have not been over his knees?—Yes, I believe that. These observations I have given you were taken with great care in order to determine what the effect would be from the removal of London Bridge, and are quite to be relied upon.

8956. You have dredged very heavily in the Pool? —Very heavily.

8957. Up from the estuary there has been very heavy dredging?—Yes.

8958. Has there been much dredging above the London bridges?—An immense deal.

8959. The result would be a general lowering of the incline of the bed of the river?—Yes.

8960. And a lowering of the low-water level at Teddington lock?—Yes.

8961. In proportion to the depth dredged, and also to the improved incline of the river, would be the lowering of the water line at Richmond?—Yes, the inclination having been made so much more steep the water would run off more quickly.

8962. Whatever the actual lowering may be you have no doubt that there is an actual lowering, and that it has been caused not by a diminished rainfall, or by land drainage, but simply by the dredging operations?—I believe so.

8963. The abstraction of the water by the water companies would not account for it?—No. I should say the dredging was absolutely necessary upon the removal of London Bridge.

8964. (*Professor Way.*) Would it not be possible to lower the whole line of the river bed equally, so as to put the water at Richmond in the same condition as when the weir of London Bridge existed?—That is possible; but I do not think that any reasonable amount of dredging would do it, for this reason, that when, as you term it correctly, the weir of London Bridge was in existence the water of course was spread over a larger surface, but if you dredged within reasonable limits, the surface of the water would become more contracted, and though you might in that channel succeed in getting all the depth you wanted, there would be more of the foreshore of the river left exposed.

8965. Has it come to your notice that a memorial has been presented to the Conservators, asking that a new weir and lock should be placed on the river, so as to pond the water at Richmond from Isleworth, and to make a new reach up to Teddington?—Yes.

8966. Do you see any insuperable objections to that?—I do. The number of drains which now exist above Isleworth. The section before me I had taken in consequence of the question being mooted of the new lock. It shows the level of all the outfalls and all the drains between Teddington lock and Brentford. There are upwards of 80 of them.

8967. (*Chairman.*) Would not that objection be removed if, simultaneously with that ponding, you made an intercepting sewer on either side to receive the contents of those drains, with an outfall below the lock and weir proposed, so as to preserve the same fall?—Yes; but the objection that I think puts such a thing quite out of the question on a lock river is, that the drainage now comes in in such quantities.

8968. Supposing all the parties joined in a scheme for that interception, and that the refuse, instead of passing into the Thames by so many months, was kept back and utilized, so as to remove the injurious properties of the sewage, would not that be an improvement in every way?—It would.

8969. (*Professor Way.*) Supposing it should please the Legislature to bring in a bill to compel the keeping of the sewage out of the river, it would follow as a matter of course that this weir and lock might be more practicable?—Yes, so far; but I think there are other objections to it.

8970. Will you state them?—It would be necessary to exclude the flowing tide altogether. The flood tide is very much charged with mud. I had an opportunity at Kew in the last summer of measuring a deposit made by the flood tide, and I found that where the water was quite still it deposited about an inch in a month. Unless the tide were excluded, of course the deposit which would take place behind that weir would in the course of years be very considerable, and it would create a very great nuisance indeed.

8971. (*Chairman.*) The effect of Teddington weir is to exclude the tide from below?—Yes; but the river is in a perfectly different state at Teddington to what it is at Brentford.

8972. Would it be necessary that a weir at Brentford should be raised relatively higher than the weir

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at Teddington, to exclude the tide?—Yes, the water at Teddington on a flood tide is merely headed back; therefore, no deposit takes place, for there is nothing to deposit, but it is very different indeed at Brentford, where the water is very largely charged with mud.

8973. That if you placed a weir lower down the river would not the effect be that the present tidal flow at Teddington would be transferred to the reach below?—Yes.

8974. (*Professor Way.*) Would there be any difficulty in making a weir to keep back the tidal wave?—No.

8975. (*Chairman.*) Would the water be more muddy than the water that flows to Teddington?—Yes, I am sure of that. The mud is there, and the construction of a weir there would not alter that circumstance.

8976. The tendency of all rivers, having artificial ponds upon them, is necessarily to silt up gradually the intervening space between the ponds?—To a certain extent.

8277. In fact the ordinary minimum and maximum flow of the river each make a channel to suit themselves when the pond has been long enough in use to let that take place?—Yes.

8978. Do you anticipate any difficulty in maintaining these ponds by artificial dredging?—No.

8979. (*Mr. Harrison.*) If the weir was half-tide weir the muddy water from below would come and make a great deposit between Teddington lock and the new weir?—Yes.

8980. Therefore it must be a full-tide weir?—Yes; but then you would pretty nearly inundate the district above.

8981. (*Chairman.*) Permanently inundate it?—Yes.

8982. (*Professor Way.*) You could not have that without embankments?—Even then it would be putting a great deal of property into a very undesirable position.

8983. Without giving a definite answer as to what might or might not be done, you may well say that the project of a new lock at Isleworth is one which would require very serious consideration?—Yes, decidedly; and there is another point which is of very great importance, and that is that you would exclude about five miles of tidal water, which acts as a scour below.

8984. You would shut out five miles of navigable water, which now returns each tide, and uses its hydraulic power in cleansing the river below?—Quite so.

8985. (*Mr. Harrison*) Would you diminish the total quantity of the tidal water coming up the river?—If it was a full-tide weir, to the height of Trinity high-water mark, you would decidedly.

8986. (*Chairman.*) Then you would diminish the scour both ways?—Yes.

8987. (*Mr. Harrison.*) Is it not the case that by the time it is high water at London Bridge the water has gone down some two or three feet at the entrance of the Thames?—Yes.

8988. Would the quantity of water flowing in and out of the Thames be diminished by the weir?—Decidedly; I think it would have a most important influence.

8989. I gathered from you that the operations on the lower part of the Thames had been such as to diminish the water at Richmond and the neighbourhood?—Yes.

8990. And therefore the people of Richmond have a claim upon the Thames Conservancy for serious consideration as to how the mischief that has been done can be remedied?—Yes, no doubt they are in a worse position than before.

8991. Up to what point is the Thames at present navigable for barges at all times of the tide?—Not much beyond Putney from London.

8992. From Teddington upwards it is now navigable at all times of the tide?—Yes.

8993. Therefore the part between Putney and Teddington lock is the only part of the river along which boats are prevented from going at any time of the tide?—Yes, when the tide is low.

8994. It appears undesirable that the river should be left in that condition as a navigation?—Yes, I think so.

8995. (*Professor Way.*) This matter raises an argument in favour of the river being placed under one management?—Yes, certainly.

8996. (*Mr. Harrison.*) Upon what part of the river has the money paid by the water companies to the corporation been expended?—Upon that part from whence the three upper companies draw their water, between Sunbury, and Teddington.

8997. Of course the abstraction of that water, to some extent, influences the river even at Richmond?—Yes.

8998. Therefore so far there would be a claim on the part of Richmond to have the money expended in the improvement there?—Yes.

8999. (*Chairman.*) Have you authority to ask for a return of the actual volume of water pumped by the several companies?—No; but there is a power reserved in the deed which secures the annual payments, that the engineer to the conservators shall have access to the works at any time.

9000. Do you think that in any new Bill the companies should be required to give in a weekly statement of the daily volume of water pumped?—I think it would be a most desirable thing; such a return ought to be sent in to the Board of Trade. The Board of Trade already have a control over water companies, and a penalty can be inflicted upon water companies for taking water from the tidal part of the river, or from any spot below Teddington lock.

9001. In the upper reaches of the Thames, would you think it advisable to extinguish private rights of ballasting if any exist, and to vest all powers of ballasting and dredging in the conservators of the river?—Yes, that would be quite necessary.

9002. Would it be necessary that the conservators should have powers to use the material, or sell it for the general benefit of the navigation?—Most decidedly.

9003. Do you now sell any of your dredged ballast?—Yes, whenever we can do so.

9004. At a profit?—I think so.

9005. At all events there is nothing to prevent your doing it?—No.

9006. Do you prohibit any ballasting in the river now?—It is only permitted by licence.

9007. Do you think it advisable to retain the power to permit by licence dredging in the upper reaches of the river?—Yes.

9008. So that parties should not dredge holes here, and leave banks there, but dredge according to a section furnished to them?—Yes. The regulation we make is, that they may dredge so many yards on either side of the centre line of the river.

9009. (*Mr. Harrison.*) Do you limit the depth?—Yes, and we also lay down that they shall not go within a certain distance of the bridges.

9010. Do they ballast for trade and profit?—Yes.

9011. They earn a profit?—Yes.

9012. In improving the reach at Sunbury, did you ballast to a considerable extent?—Yes.

9013. What depth did you lower the bed at the upper end of the reach?—We increased the depth from 4 to 7 feet.

9014. Did you not lower the level of the water?—Very much.

9015. You actually dredged up much more than from 4 to 7 feet of material?—Yes.

9016. Were you able to sell the ballast to advantage?—Not at all.

9017. Was it not of a sufficiently good quality?—A great part of it was of excellent quality, but there was no market for it there.

9018. Would you expect any difficulty in disposing of the ballast if dredging were carried on in the upper reaches?—I think that a great deal of what would be

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produced might be advantageously applied in works which would have to be carried on.

9019. Has the effect of improving Sunbury reach been beneficial in the prevention of floods on the adjoining lands ?—Decidedly.

9020. In any improvement of the river above Staines should you recommend the reaches to be lowered in a somewhat similar manner ?—Certainly.

9021. Would that necessitate the lowering of the lower sills of the locks ?—Yes, in every case, with one exception. Sandford lock I think is deep enough, but I think that is the only one.

9022. Have you included in your estimate of 112,000*l.* the dredging of those reaches and lowering the sills of the locks ?—Yes.

9023. So that 112,000*l.* you think would be sufficient to put the Thames into a good navigable condition ?—Yes.

9024. As far as Oxford, or up to Lechlade ?—Only to Oxford.

9025. (*Professor Way.*) Is your estimate for engineering works only ?—Yes.

9026. (*Chairman.*) It is not your duty, as an engineer, to consider anything about the bondholders ?—No.

9027. (*Mr. Harrison.*) Have you made any observations as to the minimum flow and the maximum flow of the water past Teddington lock ?—Not with regard to the maximum. I believe the minimum quantity flowing over Teddington weir is 380,000,000 of gallons in 24 hours.

9028. Has it not been less than that in the past season ?—There might have been extreme occasions when it was less, but it would be very seldom.

9029. What is the quantity of water at present abstracted by the water companies?—About 70,000,000 of gallons.

9030. The total quantity passing from above was 450,000,000 of gallons ?—Yes, that corresponds with the observation made in 1852 before the companies drew the water from that part of the river. In conjunction with the late Mr. Cooper, Mr. Walker's partner, we took our observations, and we worked out the results separately, and brought them together. We then found that it might be fairly taken at 450,000,000 of gallons.

9031. Would not an improvement of the river, by deepening the reaches, very much diminish the growth of weeds ?—Yes, it would.

9032. Would not that be a very desirable thing as respects the water supply to the city of London ?—Most desirable.

9033. Is not that an argument in favour of the water companies paying something towards the improvement of the river ?—Yes, the removal of weeds would improve the condition of the water generally. We all know that river weeds grow most freely when the water is shallow, and if the weirs were not maintained, there would be a much larger growth of weeds, and consequently the water would be much more flavoured with weed.

9034. From your knowledge of the Conservancy Board, do you think that local interests would at all interfere with a thorough improvement of the navigable bed of the river ?—I think the fact that the Conservancy Board would transact their business in London is practically no objection. The jurisdiction of the board at present extends nearly to Southend, and you can reach Oxford from London in the same time as Southend—distance is not found to be any inconvenience. The fact that there is railway communication to almost every point brings the thing into such manageable condition, that I see no difficulty in superintending it, nor, on the part of the board, in managing it.

9035. You believe that the city interest would not interfere with the conservators carrying out a thorough system of navigation up to Oxford ?—Certainly not; everything done to improve the trade of the river above would be a direct advantage to the lower part.

9036. (*Chairman.*) Do you know sufficient of the tributaries, the Kennet, the Evenlode, the Cherwell, and others to know whether it would be possible to make impounding reservoirs upon those tributaries for the use of the river, if it was thought desirable to abstract a larger quantity of water for the London supply ?—I cannot say that I have a sufficiently intimate local knowledge of the tributaries to answer that question ; I have considered it with regard to the river beyond Oxford and I see no difficulty there.

2037. As an engineer knowing the general character of the country, I suppose you think it is quite possible to find sites where such reservoirs might be made ?—Certainly.

9038. And by that means you could prevent the minimum flow of the river being reduced, and you could give out of those reservoirs a very large volume for the use of the water companies ?—Certainly.

9039. With regard to mills do you see any difficulty in regulating the use of them or would you abolish them entirely ?—I should certainly not be willing to abolish them, but regulations should be made concurrently with the improvement of the river to prevent the millers from using the water improperly.

9040. You are acquainted with the system of flashes now practised ?—Yes.

9041. If the river were put into your hands would you abolish that system, and substitute a deeper pond ?—I should certainly abolish the system of flashes.

9042. And obtain a depth of water by dredging ?—Yes.

9043. And maintain it by dredging ?—Yes.

9044. At present there is no steam dredging above Teddington lock ?—Yes ; we are dredging now near Hampton Court.

9045. There is none 29 miles above Teddington lock ?—No ; none out of our jurisdiction.

9046. Would not steam be much cheaper on the reaches above your jurisdiction ?—I think so ; I should look upon the work as almost impracticable for hand labor ; unless you can put a steam dredger to work you had better leave it alone.

9047. You could not overcome the difficulties by hand dredging ?—No ; and the work is done in so superior a manner by steam dredging.

9048. How much does it cost per cubic yard for dredging now ?—That depends upon a variety of circumstances, for instance, upon having a full supply of barges to take away the material.

9049. What is the lowest cost you have dredged for under favourable circumstances ; 2*d.* or 3*d.* a yard ?—Hardly; it is nearer 4*d.*

9050. (*Mr. Harrison.*) Would you recommend that the Government should encourage the expenditure of the 20,000*l.* or 30,000*l.* mentioned before the select committee in merely tinkering up the present works on the navigation ?—No ; it would be quite thrown away.

9051. (*Chairman.*) You could not repair the present locks for 12,000*l.* or 14,000*l.* ?—No ; that money would be entirely thrown away.

9052. (*Professor Way.*) When you speak of restoring the navigation you mean that you would go further than that, and set up a proper navigation ?—I would improve the river beyond what it has ever been.

9053. (*Mr. Harrison.*) The works have never been carried out in accordance with the views of the old engineers ? — There is a cardinal defect running throughout the whole of the locks, they are too shallow.

9054. Should you if the navigation was restored recommend a continuance of the old locks ?—I should recommend a modification of them ; at 2 or 3 of the weirs under the jurisdiction of the conservators I have introduced or extended what are called tumbling bays ; that is, constructing the fixed part of the weir so that the top may be about level with the summer head ; the consequence is that as soon as a freshet comes it relieves itself over into the tumbling bay ; I have found the greatest possible benefit to result from that ; I have looked at the weirs on the river when I have

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been between Oxford and Staines to see whether such a thing could be introduced and I found in almost every instance it could be most advantageously.

9055. Would you have a sufficient length to discharge an ordinary flood without removing any of the moveable tackle?—No; but I should not rely upon that entirely; I think it is very advantageous to have a portion of the weir with moveable tackle.

9056. Would you have these tumbling bays of such a length that they would prevent the miller adjoining raising the water so as to injure the adjoining land by flooding?—It would have that effect.

9057. Can you devise any means by which millers should be prevented from lowering the water below the level serviceable for the navigation?—The readiest way would be to have proper water marks affixed, and penalties imposed upon the water being drawn below the marks.

9058. If the river was improved as you propose, and flashes done away with, a great deal of the cause which the millers have now for working the water lower than is desirable would be done away with?—Yes.

9059. Their object would then be to keep the water at as high a level as they could?—I do not think they would be sufficiently particular in that respect, unless they were compelled to be so.

9060. Have you looked into the question of the navigation above Oxford?—No; but I understand that it is an abandoned navigation, there is no trade on it or scarcely any; but I am sure it would be an improvement to the land to have that navigation in an efficient state.

9061. An improvement with respect to floods?—Yes, I am sure of it.

9062. It would be beneficial to millers as avoiding the waste of water caused by flashes, and dredging the reaches, as you propose, would clear their mill-tail for them?—Most decidedly.

9063. Therefore an improvement of the navigation would really meet the interests of all parties concerned?—I have no doubt of it.

9063A. (*Professor Way.*) Would you recommend that the part of the river between Oxford and Lechlade or Cricklade should be included in any arrangement that might be made?—Certainly.

9064. (*Chairman.*) You are well acquainted with the embankments on the lower parts of the Thames, from the estuary to Woolwich and West Ham?—Yes.

9065. I believe the age of those embankments is not known?—No.

9066. Have you any idea of the area of land that is embanked in the lower part of the Thames?—No, but very extensive; there must be thousands of acres.

9067. Those embankments are from 5 to 15 feet in height on the land side?—Yes.

9068. And they effectually, so long as they are maintained, prevent flooding in the marshes?—Yes.

9069. Looking to the character of those banks, the work they have to do, and the length of time they have existed, do you think it impossible to embank the upper reaches of the Thames, so as to prevent such enormous flooding as has taken place in the last week?—No, I do not think it would be.

9070. If you can embank marsh land, which is every 12 hours below the high water line, you could more easily embank agricultural land that is only periodically flooded?—Yes; but I do not think that that is a desirable way of preventing flooding. The flooding of the land is an unmixed evil if the water is allowed to lie upon it, but an occasional flooding of the land, I believe, is considered by farmers to be beneficial.

9071. Would it not be quite possible to arrange your banks in such a way as to prevent floods destroying the crops, and yet to enable the farmer to let the water on to his land at such times and seasons as he wished?—I do not see how that could be done.

9072. Might not flood-gates or inlets be made by which flood water might be passed into conduits, and so serve for irrigation?—I do not see how you could get the water sufficiently high to irrigate the land.

9073. Surely there would be no difficulty in the case of a flood like the recent one in allowing the water to pass on to the land, if the farmer desired it, at points where he had it under control?—No; but the irrigation you speak of, I presume, would be in the summer time.

9074. No.—The difficulty that I see would arise if the farmer wanted the water for the crop growing in the early part of the season; I think the water in the river would then be too low to admit of it.

9075. With the river unembanked a flood of the present kind might take place in the very height of summer?—It does occur, but not to so great a height according to our observations this is the highest flood since 1852.

9076. Are you aware that even with this flood Oxford has not been heavily flooded, and that this flood has come from the Kennet, and Loddon, and the Wey, and not from the Cherwell, and the Evenlode, and Windrush?—There has been a very considerable flood at Oxford.

9077. But nothing so heavy as at Windsor?—I am well acquainted with the fact that there are local variations in the floods, because between Staines and London we find it very perceptible.

9078. (*Mr. Harrison.*) Are the weirs at present upon the Thames generally constructed with a considerable extent of backing?—Yes.

9079. Do you consider that desirable?—Yes; to maintain the weirs I do.

9080. But to pass the flood water?—I do not think it operates much against that.

9081. The weir at Teddington I see you have formed in steps?—Yes.

9082. Do you consider that a desirable way of constructing a weir upon a river?—Yes; and my reason is this, it breaks the force of the stream as it comes over the weir, and causes it to operate less upon the backing below.

9083. Have you observed that the weirs upon the upper part of the Thames are at present so constructed that the flood water forms a very deep hole immediately below them, and frequently a bank beyond, which becomes a serious obstruction to the navigation?—That is so.

9084. In the estimate you have given, do you contemplate an alteration in those weirs to prevent that action in future?—Yes.

9085. (*Chairman.*) Have you observed the condition of the river below the points of outlet for the metropolitan sewage since those outlets have been in use?—I have not myself particularly noticed it, but I have frequently asked the surveyor and others in my department whether they have noticed any effect from the sewage being thrown in there, and their reply has been "Yes." In the case of the northern outfall I have noticed it, and close to that there has been a considerable deposit of mud.

9086. A sort of bank in the river?—At low water.

9087. Have complaints been made by persons navigating the river of any increased stench from the volume of sewage poured out at one point?—I have heard it remarked by the surveyor in my office that in carrying on a survey at Erith he noticed at the time of low water a horrible stench whenever a steamboat came by, and stirred up the water.

9088. Has any sewage been returned to London by the oscillations of the tide since the outfalls have been in use?—I do not know that for a fact.

9089. Do you know for what distance down the river a nuisance has been experienced at low water?—No. I have not heard of any other than that at Erith which I have stated.

9090. Have any inhabitants at Erith complained to your board of a nuisance?—No.

9091. I believe the Woolwich Board of Health complained to the Metropolitan Board?—They did.

9092. Attributing to the fouling of the river the

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disease that prevailed?—They did during this last summer.

9093. And an inquiry was made?—Yes, and there was a report made by Mr. Bazalgette.

9094. (*Professor Way.*) Was no complaint made at Gravesend?—I have not heard of anything.

9095. (*Mr. Harrison.*) The Conservators have power under their Act to call upon riparian proprietors to repair their banks to some extent?—Yes.

9096. Is it desirable that the Commissioners in charge of the upper Thames should have similar powers?—Yes.

9097. Does the towing-path past Kingston belong to the Conservators?—No, it does not; they have it on lease.

9098. I believe it was in consequence of that that they raised an objection to the Kingston people passing their sewage into the river?—Yes.

9099. There is a considerable population in Surbiton adjoining Kingston?—Yes.

9100. Are you aware that they carry their sewage at present into the river?—Yes.

9101. (*Chairman.*) I suppose you know that the sewage of the whole district goes in?—Yes.

9102. (*Professor Way.*) Have you any power to prevent that?—None at all.

9103. If the Conservators took the whole management of the Thames into their hands, would it not be right that they should have such a power?—Decidedly. I believe that the Conservators can prevent any fresh drainage into the river.

9104. (*Mr. Harrison.*) Have you observed any ill effects from the discharge of the sewage from Surbiton and other places?—I have noticed that the water has become within my recollection very foul.

9105. Have there been any deposits in the river consequent upon that?—There is the ordinary black residuum from drainage, but nothing in the shape of soil.

9106. In summer time when the water is lower than usual, have you found the banks of the river offensive?—Yes. I was coming down the river one day this last summer with the Conservators, and when we got to Kingston bridge, we could smell the sewage from the drain that discharges at the railway bridge quite distinctly; a strong disagreeable smell.

9107. It was stated in evidence that the sewage from Surbiton was carried towards the centre of the river, and that it was there so mixed with the water as to cause no nuisance. Do you consider that arrangement a fair one?—No.

9108. You think that the body who have control of the Thames should have power to prevent the passing of any sewage or deleterious matter into the river at any point?—Certainly.

9109. That power should not merely apply to any future outlets, but it should extend to those already existing?—That I think would be rather a strong measure.

9110. If it can be shown that the sewage could be turned to account in any other way, what would you say then?—Then decidedly the Conservators should have power to prevent it being thrown into the Thames.

9111. (*Professor Way.*) I suppose, if it were once acknowledged that the keeping of rivers clean was part of the duty of the Conservancy, power would be given to them to take any additional steps for that purpose?—If there was power to prevent the sewage being discharged into the river, the local authorities would be compelled to find some mode of dealing with it.

9112. There are many isolated houses where separate dealing with sewage might be a very difficult matter, and it was suggested some time ago that parallel drains might be made for them. Who do you think should be the proper people to carry that out?—I think the local authorities.

The witness withdrew.

Adjourned till Wednesday, February 7, 1866.

Victoria Street, Wednesday, 7th February 1866.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

JONATHAN THORP, Esq., examined.

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9013. (*Chairman.*) You are deputy chairman of the Thames Conservancy Board?—Yes.

9014. You gave evidence before the Select Committee of the House of Commons on the river Thames?—Yes.

9015. May we regard that evidence as representing your opinions now?—Yes, generally you may.

9016. Do you think that the river might still carry a fair share of traffic if put into proper condition?—Yes.

9017. If a bill were framed, based upon the recommendations contained in this report of the Select Committee, do you think it would be advisable to put upon the Conservancy Board persons who would have actual knowledge or be directly interested in the upper part of the river, for instance, representatives from Oxford, Reading, and other towns, and also representatives of the riparian proprietors and of the millers?—The Conservators of the Thames have charge now of the lower part of the river for 80 miles, and which is one of the most important parts of the river, and there is no such representation of that lower part.

9018. I suppose, if you were to compare the value of the property upon that section of the river under your jurisdiction, it would be quite equal, if not superior, to the value of the property in the upper part of the river?—Immensely more so.

9019. Do you know how the Commissioners are constituted for the management of the upper Thames?—Yes, I know the character of it.

9020. The board consists of 800 members?—Yes.

9021. Do you think it would be practicable to carry on your duties with the intervention of such a board as that?—No, it would be utterly impossible.

9022. Are the members of the Conservancy Board paid for their attendance?—Yes.

9023. What amount do they receive?—They receive 1,200*l.* a year; the practice commenced in 1865, before that they were not paid.

9024. You have a debt?—Yes.

9025. How was the money borrowed?—In the year 1812 the Corporation of London borrowed from the general public, for the construction of locks and weirs, about 170,000*l.* at 5*l.* per cent. on the security of the tolls. The Corporation of London repaid about 40,000*l.*, and also reduced the rate of interest to 3½ per cent., before the management of the river and the

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debt were transferred to us; we now pay 3½ per cent. The present amount of the debt is about 120,000*l.*

9026. Have you the means of extinguishing that debt altogether?—Yes.

9027. There is a debt now of 84,000*l.* upon the upper navigation in charge of the Commissioners, would you be prepared to take that?—Certainly not. When an estate is insolvent we know very well that it must be wound up in the best way it can. You cannot ask people to take the liabilities and bad debts of others. I believe that there is no interest paid upon this debt, that there are no assets, and no trade.

9028. Do you think that that question might be fairly left to the Government?—I do certainly. I believe that the present Conservancy Board would be able to manage the upper part of the river as well as they manage the lower part of it, but the Conservancy Board are not desirous that the management of the upper navigation should be transferred to them. If, however, Parliament and the public desire, they will take charge of it, and I believe they are fully competent to manage it.

9029. (*Professor Way.*) But they will not take any responsibility with regard to money?—No, I think not.

9030. (*Chairman.*) I find that by clauses 101 and 102 of 20 & 21 Vict. cap. 147 a penalty is inflicted for throwing ballast and rubbish into the river?—Yes, but you will find that there is a saving clause, 166.

9031. Do you think that saving clause should remain or be repealed?—It ought to be repealed.

9032. Why were steps not taken to repeal that in the subsequent Act?—I can only state that I had several conferences with the authorities upon the subject, and they did not seem to like to touch it.

9033. Did you know at that time that a commission had been appointed specially to inquire into the utilization of sewage and the modes of distributing it in 1857?—Yes.

9034. In your opinion the saving clause to which I have called your attention in the Act of 1857 ought to be repealed?—Yes; I think that the Thames should not be used as a drain for filth.

9035. Then with regard to the 27th and 28th of Victoria, cap. 113, "An Act to amend the laws "relating to the conservancy of the river Thames, and "for other purposes," dated 29th July 1864, do you consider that clause 74 is sufficiently strong and clear, or have you attempted to act under it?—Yes.

9036. The "Smoke Act" is considered to be in force in London?—Yes.

9037. Is it considered to be in force upon the Thames?—Yes; but we have had no special instructions upon the subject.

9038. No special reports are made to you as to whether steamers do or do not cause a nuisance by smoke?—No, we have no special power to prevent it.

9039. If you possessed such power, do you think it might be advantageously exercised?—I think so.

9040. With regard to another matter: would it not be advisable that a system of scavenging the Thames should be established as the scavenging of a highway?—My opinion is that it is undoubtedly a part of the ancient duty of the Conservators of the river to remove carcases, and in our district we put it in force. You might impose a penalty for throwing anything of the kind into the river, and that would soon check it.

9041. (*Mr. Harrison.*) It is admitted that the Thames Conservancy have exercised the powers entrusted to them with advantage to the public. What are the chief works which they have carried out?—I will begin from Staines downwards. We have improved all the locks and weirs and towing-paths. We have dredged and deepened the bed of the river, and generally improved the navigation of the upper part from Staines down to London Bridge. Below London Bridge we have dredged the channel of the river and removed many most objectionable shoals. We have placed moorings in convenient places for the use and accommodation of the shipping that has to lie in the river. We have constructed piers at different parts of the river for the use of persons embarking and landing from steamboats, and we have improved all the stairs and landing places that required improvement on both sides of the river. We have required owners of wharves and banks in all cases and constantly to keep their wharves and banks in repair, and where it has been our duty so to do we have, without exception, altered and improved the banks of the river Thames.

9042. Do you consider that if any powers were granted to the Conservancy with reference to the upper Thames, they should be empowered to call upon riparian proprietors in the upper part in a similar way to repair their banks and wharves?—It would be better that those who have charge of the river should have charge of the banks. It frequently happens that the material which is dredged from the river, and which you have great difficulty in disposing of, is the very material that would be useful for the formation of the walls or banks.

9043. Would you provide that those to whom the power was given should maintain the banks in the position in which they were when the river was handed over to them?—Precisely, unless there was some good reason for not doing so. Under the Conservancy Act of 1857 the Conservators have power to widen, or to contract, or to divert, or to do anything that may be considered necessary.

9044. (*Professor Way.*) Without making compensation?—No. If you require land you must get it by agreement, and where compulsory powers are required you can have recourse to the Lands Clauses Consolidation Act. I wish just to add this, that the Conservators have most carefully exercised supervision over the river which is in their district, to see that no impurities, excepting sewage, have been passed into it; they have done their utmost to keep the river Thames in a proper state; they have prosecuted all parties whom they have found offending.

The witness withdrew.

Capt. E. Burstal.

Captain EDWARD BURSTAL examined.

9045. (*Chairman.*) You are secretary to the Thames Conservancy Board?—Yes.

9046. For what length of time have you been secretary to that board?—Eight years. I had made a number of experiments previously to joining the board, and since then I have had a great deal of experience and been on the river a good deal.

9047. You made a survey and a report, I believe?—Yes, in the year 1856, of the river from Putney Bridge to London. The sections plotted from that survey are contained in the report made to the House of Commons dated February 1857; on those sections were plotted the sections made by Mr. Telford, in 1823, to show the difference.

9048. To what extent is the navigation carried on?—The main navigation, commercially speaking, is from London Bridge to Chelsea, that is what I should call the metropolitan navigation; there is other outside navigation, such as that which comes from Brentford or the Great Western docks, and other places above Teddington weir.

9049. Is there river navigation for small steamers throughout the whole length of your jurisdiction to Staines?—Yes.

9050. Have you made the navigation since the Conservancy Board came into operation?—No, the river was navigable before throughout, and it has been improved since that.

9051. What effect have your dredging operations in the lower reaches of the river had upon low water at Richmond, or below Teddington lock?—The dredging that has taken place below London Bridge I do not think has had any effect whatever upon the upper part of the river, but the dredging which has taken place above London Bridge, where the bed of the river begins to rise, has no doubt lowered the low-water level of the river below Teddington lock, all the way down to Westminster.

9052. That is to say, you have lowered the incline of the bed of the river, and the water runs down more rapidly and to a lower level?—Not quite that; the chief cause of change has been the removal of shoals which prevented the water of the river from running down the incline.

9053. Do you know how much lower the water ebbs now at Richmond?—From my own observation I cannot state, but according to observations that have been made, very careful observations, by order of the Conservators, both in 1860 and in 1865, the low-water surface at Richmond is 1 ft. 4 in. lower than it was prior to the removal of London Bridge (which removal is the great cause of the water subsiding), and also prior to the removal of several banks between London and Richmond.

9054. Would you be surprised to learn that at Richmond Bridge the present low-water level drops 3 feet below the low-water level as recorded there when the bridge was built?—I should be very much surprised to learn that, because a comparison of the low-water level, as taken by Mr. Telford in 1823, with the low-water levels taken by order of the Conservators and under the direction of Mr. Leach, does not show anything like such a diminution. There may be exceptional circumstances in which the river is denuded entirely of land water, the water may run off, a westerly wind would blow the water off to a greater extent.

9055. There was also this statement made, that a person could ford the river at Richmond, that a child might have done so at extremely low water last summer?—I think that that is very possible.

9056. (*Professor Way.*) Has not dredging been going on since the last time the levels were ascertained?—Yes.

9057. Therefore perhaps there has been a change since then?—Yes, but I do not think any change is due so much to dredging as to the removal of London Bridge, and to the removal of a part of Westminster Bridge also.

9058. London Bridge acted as a weir?—Yes, it acted the part of a dam to the river, and heaped the soil up to such an extent that the Conservators of the river had to dredge a very considerable portion of the bed of the river from London Bridge to Southwark and to Blackfriars Bridge, in order to make the channel navigable.

9059 (*Mr. Harrison.*) What has been the character of the banks and shoals that have been dredged?—Principally gravel, above London.

9060. And below London?—Below London, in the Pool, we have generally got into a very stiff clay.

9061. Not deposited?—Certainly not, and with very little accretion, it is real London clay. The first shoal the Conservators dredged away was off Limehouse dock, off Cuckold's Point, and it was generally believed at that time that that shoal (which was called the Limekiln shoal) was an accretion, and that when removed the shoal would form again; but the dredgers had not been there long before they found a stiff clay, a compact stiff clay. The shoals which were dredged away after that were banks in Blackwall Reach, they were composed of gravel of rather a compact character. The next was Ham Shelf, a very large shoal, forming the northern limit of Woolwich Reach, and near the middle of it. It was peat and moorlogged, and of original formation.

9062. What has been the effect upon the scouring of the river below of the removal of obstructions at London Bridge and elsewhere?—There is no doubt about this, that since the removal of London Bridge a great volume of water has found its way down through the pools, and assisted to scour the detritus more seaward than it did before, because London Bridge heaped the water up to the extent of 5 feet; therefore there is all that depth of water, multiplied by its breadth and length, to go out to sea.

9063. Where does the scouring chiefly take place now?—I think that all material held in suspension is carried away with the flow of the stream; there is very little deposit anywhere, except in bays where neither the flow nor the ebb have been sufficiently strong to carry it away.

9064. From what direction does the flood water come into the Thames—from the southward?—No, from the North Sea.

9065. In which direction does it ebb out?—It ebbs out againt owards the North Sea; the latter part of the ebb stops at the entrance of the Thames and goes away in a southerly direction, towards the North Foreland, and the first part of goes down the Swyn towards the North Sea.

9066. Has the quantity of water that is admitted above London Bridge any beneficial effect in improving the entrance at the mouth of the Thames?—So small as not to be appreciable. Shoals at the entrance of the Thames undergo change according to the nature and quality of the material; the shoals on the northern portion, such as Gunfleet, Middle Shoal, Buxey, and the Shipwash, have undergone little or no change. Margate Sands, Goodwin Sands, the Shingles, and the Girdlers, which shoals form the southern part of the embouchure of the Thames, have undergone a great change; they are essentially quicksands.

9067. To what do you attribute that change—is it connected with the Thames?—I think not; I think it is attributable more to the influx of the stream coming in from the sea. For instance, Bullock's Channel and Alexandra Channel were in existence when I was employed on the survey of the entrance to the Thames, but they were not so deep as now. I attribute the opening out of those channels to the simple effect of a strong current passing through them, particularly on a flood tide, which sets in in a westerly or north-westerly direction. We must not look at the Thames as we do at the Tyne; in the Thames we do not get that influx of sea sand coming up and filling up the centre of the river, making sands; we certainly have no shoals in the Thames above Sea Reach.

9068. Is it not requisite that a body of water should pass into the Thames as into the Tyne for the purpose of clearing away the bar at the entrance of the river?—There is a shoal in Sea Reach called the "Middle;" it lies off Leigh, between Leigh and Southend; that shoal and the bed of the river there are composed of very fine stuff; if you take and dredge it, and get the stuff into a quart pot, you will find that it is composed of nothing but silt. I believe that that stuff has been washed down from the river; the river, after passing a narrow portion where the tide runs very strong (below the Chapman at Canvey Island), opens out into the wide space at Leigh, and there the stream does not carry the silt away, and a shoal is formed. I believe that the Blyth sand, which forms the southern portion of Sea Reach, is composed of stuff coming down the river.

9069. Would the exclusion of a certain portion of tidal water in the neighbourhood of Richmond have any material effect in the scouring of the river below?—It is difficult to say, but I should be very sorry to see the experiment tried.

9070. (*Chairman.*) Having had considerable experience in tidal rivers, you would hesitate very much to interfere with the natural action of the Thames?—I should very much.

9071. Neither you nor anyone else could foresee what the effect might be?—No; it would be quite problematical; general opinion would be adverse to the experiment being tried.

9072. We have had it stated in evidence that the inflowing tide takes up vast quantities of mud and deposits it upon the shoals and banks below Richmond?—No doubt that is so. The shores of the river are muddy and are stirred up by the action of the steamers; the consequence is that the water is made

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turbid, the stream carries it up the river, and then at slack water, where there are no steamers, mud is deposited.

9073. Have you paid any attention to the discharge of the sewage at Barking Reach from the new outfall sewer?—No; but I was employed by the First Commissioner of Works to make examinations of the set of the stream from the point of the outfall sewer at Barking Creek (when it was first proposed), and I believe my report is published. The experiment I tried was with 20 or 30 floats, which were allowed to float up and down for days together to see what became of them. The result was, that if those floats represented the stuff held in suspension in the river, that stuff would ultimately go to sea at about five miles a fortnight.

9074. That would represent the full tidal flow of the stream?—Yes; for instance, at Barking Creek, if you put in a pole at high-water spring tide it will find its way a certain distance down the river, probably to Northfleet; at the next high water that float would be a little further up the river; but the result would be, after several days, or after one lunation, that those floats would find their way seaward at the rate of five miles in a fortnight.

9075. The rate would depend upon the quantity of water coming down the river?—Yes. Those experiments were made in June, when the river was in a normal state and not overcharged with land water. If there was much land water out the matter in suspension would go to sea faster.

9076. From your experience of the river, have you any hope of making it a bright stream?—Yes, I have very great hope.

9077. Do the spring tides or not bring in muddy water?—They bring in muddy water, but the river stream coming down carries that away, and you get the river charged altogether with a large proportion of good clear water that will ultimately bring the river into a good state.

9078. Was the Thames ever a very bright stream?—If you mean pellucid, I should think not; but there is no doubt about this, that it was far cleaner before steamers were invented than it has been since; it is the steamers that stir the shore up. If you go down the river and watch the action of a wave made by a paddle-wheel steamer it is something frightful; it will tear away masses as large as this table from the saltings, and the rebound mashes the muddy portions up, at least it mixes up the muddy portions with the water and makes the water turbid.

9079. Originally the water would be discoloured by the soil?—Yes, naturally the water would be of a brown earthy colour.

9080. But before intercepting sewers were formed the river had the appearance of a foul stream?—Yes; when I was employed on the survey in 1856 and 1857 the river was in a most filthy state. The whole contents of the sewers went into it, and then the sewage oscillated up and down passing London. The river there had not the same power as at Barking Creek to carry it to the sea. I made other experiments that were never reported upon. I found, when the river was in a normal state, that if I put floats in at high water at Waterloo Bridge they would go a certain distance down the river on an ebb tide, and with the next flood tide would come up to Waterloo Bridge again. The sewage would be oscillating up and down within the metropolis, I have doubt, for months.

9081. (*Mr. Harrison.*) How far up the Thames would sewage discharged in the neighbourhood of Barking Creek at low water reach?—It never ought to be discharged at low water, and I believe that the only reason for its being so discharged is because the works were not sufficiently advanced. I think there is no discharge now at low water.

9082. If discharged at low water, how far would the sewage reach up the Thames?—To Vauxhall Bridge.

9083. (*Chairman*). What is the velocity of the inward flow?—On the average 2½ miles an hour.

9084. And the ebb outflow?—Probably 2¾, and a little more.

9085. (*Professor Way.*) The reservoirs, I believe, are made of such a capacity as to hold the whole of the sewage during a certain time?—I believe so. The sewage should be discharged at a given time, just before or not far from high water. It might then find its way a little way up to Woolwich, but the next ebb tide would take it away and it would never be seen again.

9086. Suppose it could be shown that as much money has been spent in tanks and reservoirs as would have taken the sewage 10 miles more seaward, which plan should you prefer. I ask you this question simply to ascertain the opinion of one so experienced as yourself, and not for the purpose of criticising the authorities who have constructed the sewers?—I would much rather see the sewage discharged further seaward.

9087. If discharged continuously?—Even so I think it would have been better.

9088. The system of tanking sewage even for a limited space of time tends to set up putridity, and also to foul the brickwork of the tank?—That is very likely. Supposing it possible, I think it would have been better to have taken the sewage down to Northfleet about the full end of the flood tide and then let it run off as it could, without any tank, and be diluted as the water came to it, than to have it tanked up as now and then thrown into the river at Barking Creek and Crossness.

9089. In the supposed case you mention the sewage had been regularly diluted throughout the 24 hours?—Yes.

9090. (*Mr. Harrison.*) Supposing the sewage were discharged 10 miles lower down, what would be the effect?—10 miles lower down is perhaps rather a short distance. If the sewage could be always discharged by gravitation at a point 15 miles lower than Barking Creek, and allowed to mix with the water of the river, there would be very little of it seen again.

9091. (*Chairman.*) Have you made any experiments since the outpouring of a portion of this sewage to ascertain whether there are taking place any deposits or fouling of the shores?—I have made no experiments, but some observations have been made, which show that there is a very considerable amount of soft deposit of sewage mud several feet in depth in the river at Barking. I have seen a pole stuck down several feet into this mud and brought up stinking in a most offensive manner, covered with the most frightful stinking stuff.

9092. (*Professor Way.*) Has that been near the bank of the river?—No, it is outside the low-water mark.

9093. (*Mr. Harrison.*) Is that so notwithstanding the discharge of the sewage taking place at high water?—Perhaps it would not be fair to say that, because I believe the board have been obliged to resort occasionally to discharging the sewage at other times of the tide, on account of their pumping station and all the works not being quite completed.

9094. (*Chairman.*) I suppose you would say that it would be most desirable to keep sewage matter out of a navigable river, rather than let it go in to be dredged out afterwards?—Yes. I am sure that all who are interested in the state of the river would be glad to see nothing but liquid come into it, and that the solid particles should be retained for the sake of the river and for the sake of the land.

9095. Were you much upon the river during the year 1859, when it was said to be so foul?—Yes, a good deal.

9096. Did it affect your health?—No, I do not think it did. Since 1859 I have been in the office, but when I felt it most was before 1858, when I was actually employed upon the survey of the river, making sections myself, particularly near the outlets of sewers—King's Scholars' Pond sewer, just above Vauxhall Bridge, and other sewers—I used to get the mucous membrane of my lips affected. A friend of mine, a

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surgeon in St. Thomas's Hospital, used to prescribe for the men on board the steamers gratuitously, and he has often said that the effect has been due to malaria and the state of the water from those sewers; but I was surprised to find that when the river was in such a bad state in 1858 and 1859, there was very little sickness on the river—neither the piermen, nor the bargemen, nor the Custom House officers suffered; on board the "Crocodile" receiving ship they did not suffer. I had medical evidence of all this, and it certainly did surprise me very much.

9097. May I take your opinion to be, that although a river is very foul to sight and very noxious to smell, it does only a minimum mischief to health?—Yes.

9098. (*Professor Way.*) Is it not the case that yourself and the men that you have mentioned were all men in good health, as a rule, and capable of doing a good day's work, and therefore not so liable to fall under the influence of the malaria?—That is quite possible. The only ill effects that I personally have known arise from the state of the river, that people have been made sick, I have been sick from it myself, but my friend, Dr. Ord, who was then house surgeon to St. Thomas's, attended many of the men who belonged to steamers on the river; his description to me was that the foul condition of the water had an effect on the mucous membrane, the lining of the mouth and lips, which caused a breaking out of the mouth, with febrile symptoms, and weakness—he attributed that, I know, to what the men were subjected to every hour of the day—the stuff that was thrown up into their faces by the paddlewheels of the steamers.

9099. The sickness you have spoken of may have been a safeguard, just as the most poisonous drugs are their own antidote if taken in excess?—Yes. The surgeon of the "Crocodile" said he had to give the people opening medicine, and the surgeon of the "Dreadnought" was of the same opinion; but Dr. Ord succeeded very well, and he came to the conclusion that there was a minimum amount of sickness. In the upper part of the river, where a great deal of foul stuff has been thrown in, I know that they drink the water. At Wandsworth they did for many years, and I believe they drink it now; but the question is, whether, if they drank water of that description, it would not be likely to bring upon them fever.

9100. (*Chairman.*) Did you ever serve in the malarial districts on the west coast of Africa?—No, but there are many places on the coast of Essex where there is as much malaria and ten times worse than ever there was on the Thames.

9101. (*Professor Way.*) The miasma need not be accompanied with any smell?—No.

9102. (*Mr. Harrison.*) Is any record kept of the rise of the tide of the Thames?—Yes, we have several tide gauges.

9103. Do they keep an hourly record?—No, simply of the high and low water.

9104. Are those tide gauges all referred to Trinity datum?—Yes, all, they work downwards from that datum.

9105. What is the rise and fall of the tide out at the Nore?—About 16 feet 6—not from Trinity datum; it is the range between high and low water.

9106. How much is it at London Bridge?—With a similar tide at London Bridge nearly 20 feet.

9107. Does the tide at London Bridge fall to a lower level than the tide at the Nore?—Yes, the low-water surface at London in the Pool falls to a lower level by nearly 2 feet than the low-water surface does at the Nore, and rises nearly 2 feet higher.

9108. What is the difference in the time of high water at Sheerness and at London Bridge?—About 1¾ hours.

9109. At what time does the direction of the stream change at Sheerness after high water?—About ¼ of an hour after the tide has made its mark.

9110. How long after is the highest point reached at London Bridge?—About 20 minutes, throughout the whole of the river. The stream continues to run up 20 minutes after the high-water mark is made. The midstream current will be running upwards after the tide has subsided perhaps an inch or two. The stream close inshore will be actually running downwards whilst the current in the middle will be going upwards.

9111. Have you made any observations as to the rise or fall of the tide hour by hour?—No; but there is a self-registering tide gauge at Sheerness which would show at any particular time how much the tide had ebbed at Sheerness when it was high water at London.

9112. As far as regards the navigation of the Thames between Putney and Teddington, how is it affected by the water being lowered?—On a flood, tide when the navigation commences, it is the same now as it always has been. When a young flood makes, the towing horses take the barges in tow and tow them up to Teddington, when the barges are cast off; but the difference between now and former times consists in the receding tide on an ebb; in consequence of the removal of London Bridge and of shoals above London the water drains off more quickly than formerly, and therefore below Teddington there is not so much time for navigation on an ebb as formerly, but there is just as much on a flood.

9113. The river from the Pool is navigable at all times of the tide to Putney?—Yes.

9114. And it is navigated from Teddington lock upwards constantly?—Yes.

9115. The distance between Putney and Teddington is how many miles?—About 12 miles.

9116. That is really the only part of the river within the jurisdiction of the Thames Conservancy Board that is not navigable at all times of the tide?—No doubt, and it always has been so. From Putney upwards there has never been any navigation of barges on the river, excepting tidal navigation; there is another reason to prevent navigation except in a flood tide, the stream is so strong that you cannot navigate it excepting there is a flood stream coming up to weaken the down current.

9117. (*Professor Way.*) If it could be done without serious detriment to the river in the lower reaches below Putney, would it not be a very great improvement if that part were made navigable at all times, as the parts below?—Yes, if it could be done.

9118. If the view was entertained of putting a weir and lock into the river near Brentford, it would be necessary to put it at that point where it would make the navigation continuous throughout?—Yes; but if you put a lock there the chance is that you would have the river dry below Putney. It is not as if you had a deep river at Putney, that would remain deep; the river is on an inclined plane, Putney being in the middle of the incline. Low-water mark at Putney is 14 feet below Trinity, and at London on the same day low-water mark is 20 feet, so that there is a fall of 6 feet between London and Putney; if you put a lock at Putney you must dredge the river away to an immense extent below to make it navigable up to Putney.

9119. You would be opposed to any such step being taken as that which was prayed for in the memorial, the formation of a weir near Brentford?—I should not like to see such an experiment tried; I think it would be a dangerous one.

9120. (*Chairman.*) Have you any hope of bringing fish into the river opposite London again?—The water in the river has been so good lately that I hope the time will come when fish will come up again. I think that the river will be stocked with fish about London quite as well as ever; I do not say anything about salmon.

9121. (*Professor Way.*) As to the pellucidity of the river, from what you have said I infer that as there is really no bringing up of matter from below, but merely the stirring up of that which already exists, tidal action ought, after a time, to rid us of the mud?—There will be a large quantity of fresh water constantly going down, and there will not be muddy water coming up. I believe that the water of London will be cleaner than any man alive has ever seen it.

9122. Do the steamers produce mud from the bed of the river, or merely stir up that which has already come down?—They produce it; they break off the banks.

9123. I mean above bridge?—No, I think they merely stir up what is there.

9124. Then we ought to get rid of it, ought we not?—No, for this reason, you get a fresh supply from below; there is a place at Northfleet where the waves from the steamers strike against the banks and break them away, and thus form mud.

9125. That mud would not come further than London Bridge?—Yes, it would.

9126. Then we shall always have clay in the river?—Yes, the river will be of a brown muddy colour, but not that nasty slaty color like sewage.

9127. (*Mr. Harrison.*) To what point does the salt water come up?—I do not know. When I was a young man the upper portion of the brackish water was somewhere about Barking Reach. There were saline particles in it. You would not like to drink it at high water, but at low water we used to draw it and drink it at Woolwich.

9128. Did not Professors Hoffman and Miller find that at Chelsea the quantity of salt in the water was only that which would have been brought down by the sewage and the fresh water, and that there was no indication of salt water from the sea ever reaching Chelsea?—I do not think it would come up; the water at London at high water is not very brackish at spring tides, and at neap tides of course the case is very different. A flood tide brings the sea water up very much further.

9129. (*Chairman.*) When the embankments which are now in progress are completed will the whole bed of the Thames opposite those embankments be below extreme low-water line?—There will not be very much above that line; most of the bed of the river there was actually in 4 or 5 feet of water; but when the embankment is finished there will be an enormous quantity of clay and gravel which has been thrown in by the contractors, and which I suppose they will have to remove; there ought to be some pressure put upon them to do that.

The witness withdrew.

Adjourned till Thursday, February 8, 1866.

South Norwood, Thursday, 8th February 1866.

PRESENT:

ROBERT RAWLINSON, Esq., C.B., IN THE CHAIR.

JOHN THORNHILL HARRISON, Esq. | Professor JOHN THOMAS WAY.

GODFREY LUSHINGTON, Esq., Secretary.

SOUTH NORWOOD.
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Dr. WILLIAM SUTHERLAND (of Croydon) further examined.

9130. (*Chairman.*) Have you had much typhoid or typhus fever in South Norwood in the last half-dozen years?—Yes, at various times I have attended several cases.

9131. Do you mean in the district closely adjoining this place?—In the district closely adjoining this, and also in other parts; in the district of South Norwood, on this side of the bridge, and in the district between the railway bridge and Harringdon road, where it passes by Portland road.

9132. How long have the irrigation works been in operation?—About 12 months last November.

9133. What number of typhoid cases have there been in the last 12 months within your own knowledge?—I know of none. Some other medical men will be better able to give you that information; it was in former years that I have known the district—not within the last 12 months.

9134. Can you say whether there have been a smaller or greater number of cases of typhoid fever in the last 12 months in South Norwood?—As far as my experience goes, there have been assuredly a smaller number.

9135. Should you attribute any of the cases which have occurred in the last 12 months to the irrigation works?—Certainly not; neither the cases of fever, nor the cases of ordinary illness, as far as my experience goes.

9136. Looking at the character of the works and the relative position of the houses which are now erected, should you think that any evil would arise, tending to produce typhoid fever?—I think not; there is, however, one very important fact to which I wish parcularly to call the attention of the Commissioners, and it is this, that during the last year, in the whole of Norwood, there have only been four cases of death from fever, that is to say, from what would be called low fever, typhoid and typhus fever, including all the usual fevers, except scarlatina. During the last quarter, in the months of October, November and December, there has been only one fatal case of fever in the whole district of Norwood, and the mortality has been considerably less in Norwood during the last 12 months than it was before.

9137. You have had a very wide experience, and have seen, I daresay, fever under very many aspects, and I would ask you generally, whether you consider that typhoid fever is generated by external causes, or by something internal, as overcrowding, defective ventilation, bad feeding, defective clothing, and poverty generally?—I should say most assuredly that those conditions are usually the cause of typhus and typhoid fever.

9138. And not anything external?—Certainly not, usually, unless you mean nuisances existing outside; certainly they would cause typhoid fever.

9139. You mean nuisances in immediate contact with dwellings?—Yes.

9140. Such as a foul privy or a foul drain?—Yes.

9141. Or sewage?—Yes, decomposing animal or vegetable matter near to a house would assuredly cause fever.

9142. (*Mr. Harrison.*) What is the population of South Norwood, where the four fatal cases of fever occurred?—I cannot say, but the four cases did not occur in South Norwood, but in the district of Norwood which includes South Norwood and Upper Norwood.

9143. What is the population of the whole area?—*Mr. Latham.* About 10,000.

9144. (*To the Witness.*) What has been the general health of the country during the last 12 months?—During the last quarter more especially it has been bad in many places, but during the whole 12 months it has been a little below the average. Fever has prevailed in a great many localities in different parts of the country all over England.

9145. Do you consider that four fatal cases in a year, in relation to the number of inhabitants is, as an average, a small proportion?—Decidedly, and more

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especially so, if you take into account that there has been only one fatal case in the last quarter, which is the period of the year when fever more especially abounds.

9145*a*. (*Mr. Lowe through the chair.*) You have stated that there have been four deaths from typhoid fever since November ?—No. I said during the whole of the year : from the 1st January to the 31st of December.

9146. Can you give me the names of the parties, and the situations where they lived ?—We do not know the names ; these returns are supplied to Dr. Westall from the registrar of births and deaths, and he merely gives the age and residence, not the name of the person, and the date of the medical certificate ; the particular localities could be given.

9147. Have you attended any patients in this immediate vicinity ?—I have patients in Albert Road and Harrington Road, and about here.

9148. Can you state that when you have attended upon them they have never complained of any smell arising from the irrigation works, or of any smell at all ?—Yes, distinctly. I have had no complaint from any member of those families which I attend, but I have had quite the contrary stated to me, because I have made inquiries of some of them and they have said that they did not perceive any offensive smell.

9149. That is within 300 or 400 yards of the Harringdon Road ?—Yes, and in the Harrington Road.

9150. Have you been down to the irrigation works to-day ?—No, I have not.

9151. Do you consider that a day like this, after a heavy fall of rain, affords a fair criterion as to the effect of the works ?—A heavy rainfall would make the earth less greedy to take the sewage in.

9152. On a windy day like this, with an excessive rainfall for some days before, is it not likely that the slushing and washing from the sewers, would probably lessen the amount of the smell ?—I do not feel able exactly to give an opinion upon that, but I should have expected, from the great rainfall, that the sewage water would have been less absorbed, and perhaps, therefore, the smell would have been more perceptible ; but I do not speak upon that with confidence.

9153. I ask you now whether at a period like this, or during the heat of the summer, the sewage would be more likely to be offensive ?—I should say that it might be more likely in the summer.

9154. Have you been over the irrigation works in the heat of the summer ?—I have been near to them, the houses in the Harrington Road are exactly opposite to them.

9155. Did you perceive any offensive smell when you were there ?—None whatever, and I have frequently asked a patient of mine, who lives in a cottage adjoining, and he has said he has perceived none. He had a very severe attack of erysipelas some two months ago which affected his head, and we consider erysipelas to be a disease much influenced by malaria, and his was a very severe case, accompanied with delirium, yet it went on very satisfactorily ; he lives exactly in a line with the place, and the house is opposite the church. I think it is called Wellesley cottage.

9156. But that is not the Harrington Road ?—No.

9157. During the summer time have you never heard any complaint of an offensive smell ?—Distinctly not.

9158. Have you visited the place on an evening ?—Not in the summer time. I have been there of an evening lately.

9159. In summer, after the heat of the day, is there not a certain vapour which rises from fields of all kinds ?—Yes.

9160. Is it probable that during summer such a vapour might arise from those particular fields as might be offensive ?—There are those here who can speak to the fact.

9161. But I ask you the question as a scientific man ?—I should expect that in certain states of atmosphere in summer—there might be some smell close to the place.

9162. During the heat of summer are not such odours more likely to arise than at any other time ?—Certainly.

9163. Have you never been there at that time ?—No, not when those odours were escaping from the fields ; but I can assure you, as a medical man, that I think the present state of things is a great improvement upon that which formerly existed, and there is also another thing that I wish to state. I have not even heard anyone hint at any better mode for managing the sewage of South Norwood.

9164. Do you consider that the present mode of dealing with the sewage is more free from odours than any other plan ?—Yes, more so than any I have heard hinted at.

9165. (*Mr. Harrison.*) You have stated, in answer to questions put by Mr. Lowe, that smells, if any, arising from irrigation works, would be stronger and more perceptible in summer ?—Yes, certainly.

9166. Is that the case also with smells arising from sewage and other decaying matter about the houses themselves ?—Infinitely more so, if the matter is kept there for a sufficient time to run into a state of decomposition ; but the time the sewage is kept in the fields is short, and therefore there is infinitely less danger.

9167. (*Professor Way.*) Moreover it is more difficult to raise the temperature of a mass of water than to raise the temperature of heavy sewage matter ?—Certainly, because the whole of the water must be raised to that temperature.

9168. (*Chairman.*) Is it not a fact that one great effect of evaporation is to reduce temperature very rapidly ?—Yes.

9169. Vapour takes away a great volume of what is termed latent heat ?—Yes.

9170. In irrigating fields with sewage water evaporation from the surface would tend to reduce the temperature of the water ?—Yes, and (which is an important point) also the temperature of the earth, evaporation would cool the earth, and therefore decomposition would go on less rapidly in irrigation fields than in confined places near the houses.

9171. You have two contrary effects from sewage—a cooling of the surface in summer, and a warming of it in winter ?—Yes.

9172. The sewage water being at a higher temperature than the surface in winter and at a much lower temperature than the surface in summer ?—Yes.

9172*a*. (*Mr. Lowe through the chair.*) You stated that you had patients residing in Harrington Road ?—Yes.

9173. Should you consider me impertinent in asking you their names ?—I have no objection to give you their names privately.

The witness withdrew.

Mr. Lowe stated that Mr. Swan, solicitor for Mr. Williamson, had some evidence to offer.

Mr. Swan stated that Mr. Creswell was present to give evidence to shew that the irrigation works had a prejudicial effect upon the health of the inhabitants of the district.

Mr. ALFRED CRESSWELL (of South Norwood) examined.

Mr. A. Cresswell.

9174. (*Chairman.*) I am a Fellow of the Royal College of Surgeons, by examination.

9175. How long have you been in practice in South Norwood ?—18 months.

9176. Where have you practised before ?—In India, China, Australia, and the Pacific Ocean. I was connected with the Independent Mercantile Service, the Peninsula and Oriental Company's Service, and also the Emigration Service.

9177. In your experience have you seen much fever ?—Yes, a great deal.

9178. What types of fever ?—Intermittent Bengal

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fever, Bengal bilious fever, cholera, and all fevers endemic in hot countries.

9179. Have you formed an opinion as to the predisposing causes of those fevers?—To a certain extent I have studied them, as every medical man does.

9180. Have you come to any conclusion as to whether the causes are to be found in the land or the atmosphere, or modes of life, or defective arrangements under which persons live—for instance, what causes fever on board ship?—Confined air and exhalations from bilge water.

9181. And bad food?—Fever is connected with bad food, and anything that lowers the system; exposure to wet, inferior quality of food, as well as deficiency in quantity.

9182. What should you say was the great predisposing cause of fever in India on shore?—In the case of endemic diseases or malarious diseases it would of course be the action of the sun's heat upon decomposing vegetable and animal matter.

9183. Were the places where you found fever prevailing in a cleanly and sanitary condition; was there a proper scavenging and regular cleansing, and were the people cleanly?—That is out of the question in India altogether.

9184. You have also had some experience in China?—Yes.

9185. To what causes should you attribute the diseases that prevail there?—To sudden mutations of temperature and the filthy habits of the natives; to some extent also to the same causes as in India; I am now speaking of malaria.

9186. What part of China did you visit?—Canton river and Hong Kong.

9187. Were you much on shore in China?—At Whampoa, I was.

9188. Did you make any observation of the mode of disposing of human excrement in that country?—Yes. It is a very filthy mode, but still it is a tolerably healthy one.

9189. In Canton river, may floating carcases of human beings be seen?—I never saw any.

9190. Was drinking water obtained from the river?—Yes, up above; the water is salt as far as Whampoa and Canton, but they make wells and have very good water.

9191. Should you say that the Chinese were a healthy race as a nation?—No, they are too populous to be healthy.

9192. Too crowded in their dwellings?—Yes.

9193. Did you visit any place nearly so crowded as London?—Large cities in China like Canton are more crowded than London.

9194. What type of fever did you see in Canton?—I had little to do amongst the natives, but amongst my own crew I had chiefly to treat disorders of the intestines, with intermittent fever and dysentery.

9195. How were they produced?—Under some circumstances by the marshy nature of the spot where the ship lay.

9196. Did the officers of the ship suffer, the captain or yourself?—Two officers were ill during one voyage.

9197. Did you preserve your own health?—Yes.

9198. Do you think it is possible by improved arrangements, good feeding, sufficient clothing and care, to preserve health in that country?—If you are not there too long; but very few persons escape at least one attack of intermittent fever.

9199. The Canton river is crowded with a large floating population?—Yes.

9200. What do they do with their excrement there?—They hoard it most carefully; they keep it in a vessel, and carry it on shore.

9201. Is there much sickness among the people on the river?—I do not know.

9202. The climate of Australia is considered very healthy?—Very healthy, indeed.

9203. Did you see any cases of fever there?—No, except at the diggings.

9204. Were those cases produced by the climate, or by the habits of the people?—By the habits of the people and also by exposure to wet.

9205. What were those habits?—Exposure to wet; they would divert a river, and turn the dry bed of a valley into a marsh.

9206. Probably too many might be crowding in under one tent?—Yes. I have seen as many as eight or 10 and even 12.

9207. Under a common bell tent?—Yes.

9208. You have been practising in South Norwood for 18 months?—Yes.

9209. Have you seen much fever here?—I have seen cases of fever, and of a class which has puzzled me; they appeared to be produced by the direct influence of malaria.

9210. Analogous to the influence of a marshy district?—Just so.

9211. In what part of Norwood have you seen these cases of fever?—Only in one part; at a place called Eldon Park.

9212. In what kind of houses?—In houses producing a rental of about 85*l.* a year. In good houses.

9213. Are those houses drained?—I believe so.

9214. Do you know whether they are drained or not?—On one occasion, when I was seeking for the cause of a certain effect, I did not discover any bad drainage.

9215. Have you ascertained whether those houses are drained, or whether they have cesspools?—They certainly are drained.

9216. What water supply have they?—They are supplied by the Lambeth Waterworks.

9217. Is that water supply stored in a cistern within the house?—I presume so, but I do not know.

9218. You have not inquired?—No.

9219. (*Mr. Harrison.*) Were you present this morning in the locality you have referred to?—No.

9220. In which of the houses was it that you found this type of disease?—As far as it came under my own knowledge, it was in two houses there or in three that about the same time I found the same type of disease.

9221. We visited this morning the house occupied by Mr. Williamson. Was that one of the houses in which the disease appeared?—Yes.

9222. What is the condition of the canal at the back of those houses?—It is filled up.

9223. When was it filled up?—Antecedent to my coming here.

9224. Does the water stagnate in any part of it now?—I have seen the water stagnate in it.

9225. Has it been offensive, then?—No, I never saw it stand there long enough.

9226. On visiting Mr. Williamson's house, and finding disease there, did you examine carefully about the house to see whether there was any local cause?—Yes.

9227. Did you find any?—No, I saw nothing of the kind.

9228. You did not perceive any bad smells about the house?—No.

9229. To what do you attribute the illness you found there?—It was a special type of illness, and I can only attribute it, after careful consideration, to what we in the profession call malarious influences. I cannot attribute it to stinks at all.

9230. (*Chairman.*) Is it your opinion that that malarious influence was something external to the building?—I suppose so.

9231. Have you seen much of ague?—Yes.

9232. In what countries?—In India especially.

9233. Did you ever see a case of true ague that had nothing to do with malaria?—Yes, recurring in persons who had suffered from it before.

9234. Had you ever to deal with a case which could not be directly attributed to external malarious influences?—I never saw such a case, but I have read of such.

9235. Would you not say that if you found a type of disease bearing a general resemblance to a known disease before you could determine whether its cause

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were internal or external, you must exhaust every kind of research?—Yes, if I found but one solitary case, but not if I met with several.

9236. Have you met with cases of the disease you have spoken of generally in this district?—No, only during a certain time, and in a certain district.

9237. (*Mr. Harrison.*) If you found a distinct smell adjoining a house, would that, in your opinion, be a sufficient cause for the illness?—No, because a distinct smell may arise from a hundred different influences, which may all be evanescent, but the type of disease I have referred to, was, in my opinion, and in that of others, caused by exposure to some poison for some time.

9238. Do you think that the gases arising from the sewer near to the house which was examined, would not be a sufficient cause for the illness in it?—I can only say that I found all the other houses with bad smells in them, without this type of disease.

9239. (*Chairman.*) Have you found in your experience that all persons are influenced alike by the same causes?—As we say in the profession, each individual has his own idiosyncrasy.

9240. There might be a thousand persons exposed to the same influences, but you might find distinctive types of disease set up in different constitutions?—Yes, but all those distinctive types of disease would not be set up in the same locality without a cause.

9241. (*Professor Way.*) Do you know of any other cases in that immediate district besides the case in Mr. Williamson's house?—Yes.

9242. How many?—I had two other cases in two separate houses.

9243. That would make three such cases?—Yes, as far as my own experience goes.

9244. And these are all that have occurred within the last 18 months?—Yes.

9245. Had not cases of typhoid fever even more numerous occurred in that district before the works were established?—Yes, but I am not speaking of typhoid fever. I am speaking of intermittent fever especially.

9246. Is that fever of a graver character than typhoid fever, or the reverse?—Ordinarily the reverse.

9247. I understand that five or six years ago there were as many as seven cases of fever in two or three houses in that neighbourhood?—Yes.

9248. Would you say that the district immediately around those houses is an eligible district for building purposes?—We suppose that any district is eligible for building purposes when it is situated on the slope of a hill.

9249. Is it a gravelly soil?—In building a house on a plain you would choose a gravelly soil, but if you build on the slope of a hill, a clay soil is immaterial.

9250. Do you think that this is a soil from which malarious influences are not likely to arise?—The malarious influences come from a distance, they have nothing to do with the site of the house.

9251. Are you aware that external to the irrigation fields the whole land is in a state of complete swamp?—It is always so in the winter time.

9252. Would that account for the types of fever?—If it had produced effects in one place, it would produce the same effects in others, where the same circumstances existed; all the low lands in England are overflowed in winter.

9253. Quite apart from the irrigation works might there be influences sufficient to produce the type of disease you have spoken of?—I cannot say so.

9254. (*Chairman.*) You seem to think that the slope of a hill is necessarily a healthy site?—It is ordinarily esteemed to be so.

9255. Should you be surprised to learn that after very wide experience it is found not to be so?—In the cases where a valley itself is in a state of marsh, and the prevailing winds blow on to the slope of a hill, I know it is not so.

9256. (*Mr. Harrison.*) If there were bad smells from a sewer close to a house, would the gases giving rise to those bad smells be apt to enter the house?—I presume so.

9257. If they entered the house, would they be injurious to the health of the inhabitants?—They would.

9258. If they did so enter the houses in the cases you have referred to, would they account for the sickness you found there in the summer?—The opinion I have formed is, that the drainage of the house had nothing to do with those cases of illness.

9259. But you seem to think that the application of the sewage to the land had?—I did not say so, but I will explain if you will allow me. I came down here 18 months ago, and practised in the place, I saw one or two cases of illness, and they puzzled me, one case had been fatal, and in the next case I called a consultation with a London physician and he expressed his opinion that it was an unusual case. Then, as medical men do, having effects to consider, we looked for the cause, and the cause, in his opinion and in mine, was malaria; about the same time I had one or two cases of intermittent fever within a very short distance of this place, and I thought it was very curious. However, we took no further steps, we treated our patients in the same way that we should if they had been cases of true ague in India, and the patients got well. Sometime after that I was reading some account of the irrigation works in the country, in the "Medical Times Gazette," and I was much struck with the similarity of the facts. I may mention that I used to walk of an evening along the path where the irrigation works are carried on, until at last, on one or two occasions I was so disgusted that I was driven away. In the majority of instances I had been sensible of no effluvia whatever from the place, and I thought it was a very interesting scientific experiment, but putting the results together and comparing what I had experienced on one or two occasions with what others had experienced, I made up my mind to watch this next spring to see if I had any more cases of the same nature, because all these cases occurred in the spring, in March, April, and May, and I determined that, if expedient, I would then bring the subject before the public.

9260. (*Chairman.*) Have you visited the Croydon irrigation works?—No.

9261. You know that there are such works?—Yes, but I only knew it lately.

9262. I suppose, in conducting your inquiries, you will take care to collect facts from persons who are exposed to their influences all the year round both by residence and occupation?—Yes.

9263. (*Professor Way.*) What kind of malaria would have produced the ague—suppose, for example, the irrigation works had not been established, was there anything else that would have accounted for the ague?—I will tell you the conclusion I arrived at. Sometime after reading the papers in the "Medical Times Gazette," on a summer's evening, after there had been a long draught, I walked down into that neighbourhood, and then I smelt a very peculiar smell, which brought me back immediately to the jungle of India. I could almost fancy that I could see the vapour coming up the slope, brought down to the earth by the dew, and there was undoubtedly the smell of organic impurities in the air—that is without doubt; my nose gave me unmistakeable evidence of that, and the inference that I drew was that if that were accumulated in a stronger proportion, it would be excessively noxious.

9264. You are speaking now of a still evening?—Yes. I think that any emanation from those sewage works would be dangerous, a few times in the year and under certain circumstances.

9265. As dangerous as any marshy place?—Yes, and more so, because there are more organic impurities.

9266. (*Chairman.*) Have you any idea of the distance at which these emanations might be injurious?—About 1,000 yards Dr. Parkes says.

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9267. Have you attended many malignant cases of typhus fever ?—Yes, a few.

9268. At what distance do medical men consider you are safe from contagion ?—We estimate that the poison of typhus fever is disseminated in the air in so diluted a form that it is not absolutely dangerous to you to breathe it for a short time in a properly ventilated room, unless you put your mouth within 1 foot or 1½ feet of a person ill with it.

9269. Would that emanation be of a much thicker form than malaria emanation from such fields as those below ?—In typhus fever there would be the subtle presence of the disease itself, and a certain amount of organic impurity thrown off in the air which passes from the lungs; but in the emanations, under certain circumstances, from this sewage there would be an enormous mass of organic impurities in the air in particles.

9270. Floating in the air ?—Yes, and they would indicate their presence by that peculiar smell.

9271. Would they not be surrounded by the oxygen of the atmosphere ?—They would be conveyed by the denser vapour—the damp vapour—and would be carried by it in greater quantities of dew.

9272. You said particles ? — Yes, particles. We consider that so much per cent. of the air consists of organic impurities.

9273. On a calm evening were there any emanations from the irrigated fields ?— Yes, they will always roll up on the calmest evenings. It is only then that I think them so dangerous and noxious.

9274. I suppose that dilution by water would have the same effect on the poison of fœcal matter as dilution by air has upon the poison of typhoid fever, except that the emanation from putrid sewage would be more likely to be injurious ?—Yes. I consider that when fluid sewage is spread over the surface of the earth, the earth and the vegetation absorb and deodorize effectually all the fresh sewage. On limestone or sandstone sewage would permeate to any depth, and would so pass off in any quantity without injury. On the other hand when the soil is saturated with the sewage, and when the sun's rays come down upon it during the day, and there is 1 inch or only ½ an inch of this sewage amongst the roots of the rank grass, then there may be distilled a subtle influence, which, rising in a concentrated form, is brought down to the earth. It is rolled up by the dew as I have seen it, and it may surround certain houses within a certain distance.

9275. That would be fog ?—No. I have smelt the subtle influence. Then it is only under these circumstances that a place of this description is obnoxious to complaint. The system has been tried in France, where they make poudrette, and the workmen employed at it are perfectly healthy, but under certain circumstances it is a very fatal thing.

9276. Such evil result would be rather an exception, and would probably arise from bad management ?—Or from accidental circumstances.

9277. If sewage were passed over the land, and were not stagnant, then you would not expect mischief ?—I think that the theory of sewage utilization is perfect, but every now and then a hitch may occur, which may render it dangerous.

9278. (*Chairman.*) Are you aware that the sewage is passed on to the land day by day as rapidly as it is produced ?—That is to say, the land is saturated with it day by day.

9279. It is carried on to and over the land so that the sewage does not become putrid—it is fresh sewage ?—Sometimes I have seen it a fluid on the ground, and at other times I have seen none at all.

9280. You are perhaps aware that there is no tank adequate to store anything like a day's flow ?—I know nothing at all about that. I have carefully eschewed that, and have not gone over the works at all. I wish simply to speak of the influence of the place as being malarious and that is all.

6281. Do you think it is right and proper to condemn works that you have not carefully gone over and examined ?—I do not wish to condemn them in the lightest degree.

9282. (*Mr. Harrison.*) What was the extent of the marshes in the Canton river, where your vessel was lying ?—Up and down the river, and on both sides of the rice grouds the marshes were very extensive.

9283. Was water stagnant upon them ?—Yes, sometimes. We used to find that Europeans on board ship at a certain time of the year had a great deal of fever, and at other times had not.

9284. Do you think the decaying vegetable matter in the sewage irrigation works here is to be compared with what might exist on the marshy land in China ?—Yes, and it is worse on account of the larger amount of organic matter conveyed upon the land—much worse.

9285. (*Chairman.*) In China upon what kind of land is the stored excrement put, and how near to the dwellings ?—The Chinese do not use it as we do; they take it bit by bit, and put it at the root of each plant, or they store it in large pits at the corners of the fields, and mix it with all sorts of things, and when it is turned up the ammoniacal gases seem to escape at once. When the crop is prepared they will open the fow-fow pit after being closed for six months, and spread the contents over the ground and the smell is all gone.

9285*a*. (*Dr. Carpenter, through the Chair.*) When did these cases in Norwood occur which you ascribed to malarious influences ?—I think in March, April, and May of last year.

9286. In what positions were the houses ? — In Eldon Park.

9287. Was not the old canal then a nuisance smelling offensively, and were there not also in the neighbourhood of the present irrigation works some ditches which were in a very offensive state much nearer to the houses than the irrigation works ?—I grant you that some of the cases might have occurred and no doubt would occur at the present day, but I never found bad ditches produce the same disease any where else.

9288. Were not those ditches complained of to the local board, and those very cases imputed at the time to those ditches and that canal ?—Not that I know of; certainly not. Those ditches were not complained of for three or four months afterwards.

9289. (*Chairman.*) Would you infer that if persons are residing in these houses (*pointing to the map*) and the malarial influences of the irrigated grounds produced disease there (*pointing to the map*) the same influences would pass over these houses (*pointing to the same*) ?—Yes, and pass them innocuously, for they are sheltered most effectively from the influence which I fully believe to have caused the few cases of illness I have mentioned, by the trees above them. It is well known that a single belt of trees is a perfect protection even to a town in the neighbourhood of a marsh.

9290. Do you think that a belt of trees planted round this circular drive (*pointing to the plan*) would have a beneficial influence ?—Yes.

9291. (*Professor Way.*) Had you made the acquaintance of Dr. Carpenter at the time you have spoken of ?—No, but I had asked Dr. Patrick whether he had had any cases of malarious fever or intermittent fever, and he said no; and my partner who had lived in the neighbourhood for many years had not had any cases of that kind.

9292. (*To Dr. Carpenter.*) Did you know of any cases of fever occurring in the locality in question before the irrigation works were established ?—Many cases. I do not say of intermittent fever, I do not know whether by intermittent fever the witness means ague or not.

9293. (*Chairman to the witness.*) Do you mean true ague ?—Yes; in the case of two children of Mr. Roberts' the disease was pure ague.

9294. Were they benefited by quinine ?—Yes, and they were cured in a short time. In the two cases of Mr. Williamson the poison I think was too strong for the fever to exhibit the intermittent form; those cases

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were characterized by some phenomena which could be only explained scientifically.

9295. (*Dr. Carpenter through the chair.*) Is it not the fact that ague becomes developed when a marshy district is first drained?—Certainly; the draining away of water does produce ague, it brings a larger surface and a larger quantity of decaying vegetable matter under the influence of the sun's rays.

9295*a*. Was not that canal drained at the time you have spoken of?—I believe it was at that time filled up, but the only part I know anything of is the part that I think is in Mr. Nash's place, and that I believe has been filled up.

9296. (*Mr. Harrison.*) Do you know whether when that canal was filled up, there was any system of land drainage adopted?—No; I know nothing at all upon the subject, it has only been in the last two or three months that I have taken any trouble in the matter.

9297. It has been stated that there were no drains put in to draw off the subsoil matter. If so, would that account for malaria?—Of course that is within the bounds of probability.

9298. (*Dr. Carpenter through the chair.*) Is it not the fact that some part of that canal is not yet drained?—I believe that some of the ornamental parts are not, in Mr. Nash's garden for instance; but the same is the case in South Penge Park, and there is no illness there.

9298*a*. (*Mr. Harrison.*) What was the condition of the road in the immediate neighbourhood of those houses where the fever occurred?—It was a dry spring and the roads were tolerably good.

9299. (*Dr. Carpenter though the chair.*) Have you had any cases of dysentery within the last 12 months?—No, but I fully expected in one instance to have had a case of dysentery. I have had a case of diarrhœa.

9299*a*. Would not the malarious influence you have spoken of as coming from the irrigation grounds, that is, the marshy influence impregnated as you suppose with decomposing animal matter, be likely, if it were excessive, to dysentery?—In the cases that have been quoted dysentery has not been the form of the disease, it has been in the form of simple diarrhœa, or intermittent fever, and in one case of almost sudden poisoning.

9300. Is it not the fact now that many of the houses here are in a disgraceful state?—A great many of the houses are inhabited by squatters, and have not any water supply; these squatters seem to have the idea that the whole of the basement floor of the house was intended to be their watercloset.

9301. Is it not a fact that from those houses cases of fever have been taken?—I have not sent any cases of fever from there.

9302. (*Chairman.*) Would not the union doctor be called in to attend them?—I hope so. I have had some very bad cases of diarrhœa to treat in those houses. I wrote to Mr. Lowe and to Mr. Williamson upon the subject, and the houses have been made better.

9303. Is it not possible to improve the sanitary condition of that locality by draining and cleansing, and formation of better roads?—The roads there are very good, and I consider the place is tolerably well drained too now, for the local board of works have done their best to drain it.

9303*a*. (*Dr. Carpenter through the chair.*) Are you aware of the condition of the cisterns, and whether they are ever cleaned out or not?—When I called in Dr. John Harley in consultation in the case of Mr. Williamson's children, his first question was "How "about your drains?" and next "Is the water supply "good?" The drainage was tolerably good, and the water tasted tolerably well; indeed I knew that I was perfectly safe in that respect, that Mr. Williamson would not have bad water in his house.

9304. You did not inspect the condition of the cistern itself?—No, but I tasted the water.

9305. (*Chairman.*) Do you think that taste is a reliable test in all cases?—No, but I believe if water is devoid of taste, color, and smell, it is tolerably pure, not speaking now of a microscopical examination, nor of a chemical examination. If these cases occur again I will make a microscopical examination of the water, and I shall then be prepared for any examination.

9306. You are aware probably that water, in proportion to its purity, is greedy of impurities, either gaseous or solid?—Yes, it absorbs them.

9306*a*. (*Dr. Carpenter through the chair.*) Were the cases which occurred in Mr. Williamson's family cases of typhoid fever or not?—Certainly not, they were cases of malarious poisoning.

9307. (*Chairman.*) I presume you would consider the two diseases as distinct one from another, as barley and oats from wheat?—Certainly.

9308. You must have the seed for each?—It is believed that malaria or the poisonous airs from a marsh will produce intermittent fever, remittent fever, or continued fever, and a specious of bilious fever like yellow fever, and also dysentery and diarrhœa, and induce liver disease; but we have no proof that the simple influence of malaria will produce typhoid fever.

9309. (*Professor Way.*) Would the conditions that produce typhoid fever produce other diseases, although in a minor degree?—That is a question we cannot answer.

9309*a*. (*Mr. Swan, through the chair.*) To what do you attribute the sickness in the months of March, April, and May of last year?—I should want another year's experience before I could answer that question.

9310. Do you think they were at all to be attributed to the irrigation works?—I believe that they were the effect of malaria, and on one or two occasions I certainly had in my own mind put my finger on the source of the malaria which had produced those cases of illness.

9311. (*Chairman.*) May we take it that when you first began to investigate this matter you had the impression that the irrigation works produced the type of disease which you saw?—No; when I first began I certainly had not that impression, for I actually did not know that that there was any sewage irrigation going on.

9312. May we assume this, that before you could give a positive opinion you would like to have the experience of another year?—Yes, before I could affirm positively that the illness of which I have spoken was due to the irrigation works. I must have that impression confirmed by experiments which I intend to carry out this spring.

9313. Would you fortify your opinion by making more minute inquiries, not only here, but at the other irrigation works?—I consider that we can take no lesson at all from any other irrigation works, for such is the peculiarity of the soil that we must judge of each case on its own merits.

9314. If you had irrigation works carried on on a different soil you would say that you must confine your facts to that particular soil?—Yes.

9315. (*Mr. Harrison.*) When these cases of sickness occurred were the ditches in existence adjoining the irrigation fields?—That I cannot answer, for in those days I did not go about.

9316. It has been stated in evidence that if those ditches were in existence and contained sewage in a decaying state malaria would be more likely to arise from them than from fresh sewage put over the irrigated lands?—My own opinion is that it would require a large expanse of marsh to produce malarious poison. One little ditch, however foul, would not be sufficient. It might produce sulphuretted hydrogen gas, and that sulphuretted hydrogen gas and other impurities in the air will produce typhoid and typhus fever, but not malarious influence; it needs a large expanse to do that.

9317. (*Chairman.*) You are aware, I suppose, that ague prevails along each side of the estuary of the Thames?—Yes.

9318. Are you acquainted with the writings of Dr. Christison of Edinburgh?—I have read them.

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9319. He asserts that ague has entirely ceased over large areas of Great Britain, and he also asserts that it has ceased, not from any alteration in the condition of things, but either that the disease has worn itself out, or some other conditions have risen up, so that there has been less ague within the last half century than the older physicians had been accustomed to meet with ?—Yes, before the marshes had been drained.

9320. He states that even where those improvements have not taken place something had occurred to cause the change ?—That is not found to be so abroad, for there the effect may be traced to the cause.

9321. He says that typhus and typhoid fever had become more prevalent ?—That may be, but I think in any case of gastro-enteric disease this is the great rule, that wherever there is a smell in the air there is poison there too.

9322. Are you aware that medical men assert that the malaria which causes ague is absolutely without smell ?—Yes; and that is the distinction which I draw. There is a peculiar smell about what I have spoken of, but no one who has not smelt the smell can distinguish it.

9323. Are you aware that some eminent medical men declare that sulphuretted hydrogen has no power to produce any form of fever ?—Yes, but the same causes that produce sulphuretted hydrogen also produce other organic impurities mixed up with it. If you made sulphuretted hydrogen chemically pure gas, that would be quite a different thing from an atmosphere in which sulphuretted hydrogen formed a component part.

9324. What is the gas that escapes from the purifying house in gasworks ?—Chloride of ammonia, sulphuretted hydrogen, carboretted hydrogen, and a lot of others.

9325. I mean after purification ?—Then it would be principally ammonia.

9326. Are you aware that mothers sometimes take their children when suffering from whooping-cough into the purifying house, and sent them there for a while ?—No.

The witness withdrew.

Mr. W. Baker.

Mr. WILLIAM BAKER (of South Norwood) examined.

9327. (*Chairman.*) What are you ?—A surgeon—a registered member of the Royal College of Surgeons.

9328. How long have you practised in South Norwood ?—Off and on for nearly 20 years I have been resident here.

9329. Where did you practise previously ?—I practised previously in Blackfriars, London.

9330. What type of disease have you had to treat within the last 12 months in this neighbourhood ?—Gastric and typhoid fever.

9331. And ague ?—Yes, and several cases of neuralgia in the head and face, and diarrhœa; also two of the severest cases of Asiatic cholera that I ever met with within the last four or five months.

9332. Are there any local influences to which you think these cases were due ?—I think so sometimes.

9333. Did you carefully examine the vicinity of the houses where these cases of sickness occurred ?—Yes.

9334. Were there any external causes of disease, such as foul ditches or a foul canal, or foul surfaces of any kind ?—In some instances there have been, certainly.

9335. Did you make inquiries as to the quality of the water supplied to the houses ?—Yes, and I know that it is very good in Norwood.

9336. Were there internal cisterns in the houses ?—In a great many there were, but some houses had not internal cisterns, but tubs.

9337. Were those tubs covered over, or exposed to the atmosphere?—Generally the top of them is open.

9338. Are they regularly cleansed ?—I cannot answer that question, but I think it is very likely that they are not.

9339. Would water remaining in a tub of that kind for any length of time be liable to take up impurities ?—Decidedly; it would undergo those changes which barrel-water at sea will do. It will become impure, until at last it will purify itself.

9340. Does water become corrupt more quickly in barrels or in iron tanks ?—In wood, particularly if the pitch, with which the barrels are lined, has worn away.

9341. Can you mention any special cases of disease that you have attended since the irrigation works were established, and will you be good enough to point out on this map where those cases occurred ?—Cases of fever and neuralgia occurred here (*pointing to the map*) on the east side of what is called the "freehold "ground." I think there are nine or 10 houses in the row which backs the field adjoining the sewage works where those cases occurred.

9342. What distance is it from the sewage works (*pointing to the map*) to those houses ?—About a quarter of a mile.

9343. (*Mr. Harrison.*) When did these cases of fever occur ?—One of them within 12 months. The man who died had typhus fever; he lived at the corner.

9344. When did the other cases occur ?—A little before that. I think just before the sewage works began their operations. I consider that the fever arose from that filthy ditch in which there was decaying matter and black water always running down. The ditch separated the freehold ground from that which was Miss Humphrey's property.

9345. When was the foul ditch removed ?—I believe it has been covered in since the sewage works began.

9346. Was it removed before or since the last case of fever occurred in the freehold ground ?—Since.

9347. Then the cause to which you attributed the former case of fever was in existence when you had the last case of fever ?—Yes.

9348. Have you had any case of fever there since the removal of that foul ditch ?—None.

9349. (*Professor Way.*) Whereabout was this foul ditch ?—*Mr. Latham.* It was here (*pointing to the map*) completely at the back, and also along here (*describing.*)

9350. (*Mr. Harrison.*) Was that foul ditch covered in last September ?—I do not know exactly, but I believe somewhere about that time. It was after the sewage works were established.

9351. (*Professor Way.*) There are two large houses nearly due east of those meadows (*pointing to the map*) ?—Yes, but that is beyond the works. I know nothing of them. I merely speak of Eldon Park, as they term it.

9351*a*. (*Dr. Carpenter, through the chair.*) Has not the population of Norwood much increased within the last 10 years ?—Decidedly.

9352. Was not the amount of fever that you had to treat 10 or 12 years ago much greater than it has been within the last 12 months—take for instance 1853 ?—Yes.

9353. (*Chairman.*) You had the same type of fever to deal with probably that was prevailing in Croydon ?—Yes; I always considered that that which occurred in 1853 was brought from Croydon.

9354. (*Chairman.*) You considered that they were cases of contagion ?—Yes.

9354*a*. (*Dr. Carpenter through the chair.*) Is it not the fact that the Local Board of Health have had year after year complaints of fever in various parts of South Norwood which have been imputed to the ditches, to the brickfields, and to nuisances of a local character ?—You may have had, but I am not aware of it.

9355. Have not letters been received by the board from you pointing out these nuisances ?—I do not remember any. I wrote to them about not giving us a proper road down the Harrington Road, and they very kindly answered my note, and they have since then put down a capital road with gravel.

9356. Is it not the fact that you wrote a letter to the Local Board of Health stating that a considerable number of cases of fever had been caused by certain brickfields five years ago?—Yes down, here (*pointing to the map*). I considered that the brickfields were injurious.

9357. Is it not the fact that there was a good deal of fever then prevalent?—Look at the immense quantity of water there is now in those brickfields. That is enough to produce fever anywhere.

Dr. Carpenter stated that whether the Local Board of Health were justified in trying to keep the irrigation works in their present position, or whether they were really injurious or not, he believed that they had been a benefit to the neighbourhood, and that they had improved the health of the population of South Norwood on this side of the railway.

9358. (*Chairman.*) Is there anything further that you wish to state?—Yes; I had lately a very bad case of typhoid fever (from which the patient is now convalescent) in one of those very good houses for which 70*l.* or 80*l.* a year rent is paid, Mr. Bottrell's house at the "Willows."

9359. Is the canal covered up behind that place?—I do not think the further end of it is; but most of it is filled in at the back of those good houses.

9360. Has the drainage been made complete to the house you have referred to?—I believe thoroughly so. I know that a great deal of money has been laid out upon it, and that it is in capital condition. There is no offensive smell.

9361. Do you believe that the house drain is continuously connected from the sewer without any intermediate break or ventilation?—I cannot say positively that it is so.

9362. To what do you attribute the fever?—To some noxious malaria present. I could not say exactly what.

9363. Do you think it came from the irrigation works?—It may have so come. I know that my nose has been offended most strongly by the smell of the sewage as I have come along Harrington Road.

9364. Has it been as disagreeable as passing through an ordinary farmyard?—A very great deal worse. I do not consider a farmyard disagreeable. You get the smell of ammonia and dung from the animals, and I think nothing of that.

9365. Are there any butchers' shops with slaughter-houses attached to them in South Norwood?—I do not know.

9366. The distance as the crow flies appears to be about 550 yards from the nearest corner of the irrigation works to these houses?—Yes, about that.

9367. Have you any further remarks to make?—No more than that there have been two very bad cases of Asiatic cholera within the last four months, one in the freehold ground in one of those houses at the back of the field, and the other in Farley Road.

9368. Do you think that the irrigation works had anything to do with those cases of cholera?—I thought they might have had. I could not attribute them to a local cause, because the ditch was gone then.

9369. (*Mr. Lowe through the chair.*) As you have been so much in the habit of going down Harringdon Road have you smelt anything offensive from the irrigation works?—Yes.

9369*a*. (*Mr. Lathan through the chair.*) Do you think the smell came from the irrigation works, or that it was caused by manuring the field?—From the works. On the very evening that you held your meeting at Croydon, I went down the Harrington Road to see a patient there, and there I found Mr. Williamson. On coming back with him I said, "If you will observe, I "think you will presently find a very disagreeable "stench," he said, "I do not smell anything," but presently he said he had got it and for about 100 yards it was very strong.

9370. (*Chairman.*) The distance is fully a third of a mile away from the site?—I do not think it is so far.

9371. Do you know whether this ditch (*pointing to the plan*) is open at present or not?—I do not know.

9371*a*. (*Mr. Swan through the chair.*) Have you attended any other cases of fever?—Yes; I had at Mr. Dempster's several cases.

9372. Where is their house?—It is "Malta Villa."

9373. Has there been fever there?—I have had to treat ague there; several cases.

9374. Within what time?—Within 12 months; intermittent fever, the children were attacked with it.

9375. To what did you attribute it?—I did not know then, except that the neighbourhood must be damp, and that will produce, as it does in Essex, ague.

9376. (*Mr. Harrison*). Had you any cases of ague before the last 12 months?—All medical men find ague occasionally in all neighbourhoods.

9377. What has been your experience in this locality in the past year?—I do not remember particularly.

9378. (*Mr. Swan through the chair.*) Did you attend the servant of Mrs. Dempster?—I do not remember.

9379. Did she die there?—I sent her away.

9380. Was she attacked with any fever?—Yes, with typhoid fever, and she went and died at Epsom.

9381. (*Chairman.*) Did you hear Dr. Sutherland give evidence upon a case of a woman with typhoid fever who was brought to a house near to the irrigation works and got well there?—Yes; but there is nothing in that, the removal of the patient from the presence of the local cause of the fever would account for her getting better.

9382. (*Professor Way.*) Supposing there had been noxious influences at work there, would they not have tended to keep the patient unhealthy?—Yes, they might.

9383. (*Chairman.*) You cannot always I suppose account for disease and connect the cause with the effect?—You may generally trace this sort of cases to derangement of the biliary system.

9384. Would habitual spirit drinking produce such derangement?—Decidedly, it will produce disease as well as derangement.

9385. (*Mr. Harrison.*) What has your experience been as to the amount of fever in South Norwood during the past year as compared with former years?—The outbreaks of fever are so uncertain and at the same time so distant from each other, that it is impossible to answer that question. I certainly had two very severe cases 14 or 15 years ago in two lads, but they got well. In 1853 the fever obtained the name of the "Croydon fever," and people rushed away from Croydon in order to avoid it. How it was communicated to Norwood I do not know; but it died out again, and we had not many more cases of it.

9386. Should you say that you had had a greater amount of fever during the last 12 or 18 months than you had in former years?—I think so; that is to say, more than between that time and the time when it raged so in 1853.

9387. (*Mr. Swan through the chair.*) Do you attribute that to the irrigation works?—I cannot attribute it to the irrigation works. I attribute it to malaria, and to bad smells, very often. Frequently, if we come to look close into the thing, we trace in the immediate locality of the illness what we think to be the cause of it, but not always.

9388. Were you at Mr. Williamson's house this morning?—Yes.

9389. Did you perceive a smell in one corner?—Yes.

9390. Was the smell very decided there?—Yes, it was from the trap not being perfect.

9391. Did you afterwards go to the filtering-house?—Yes.

9392. Was there any smell there to compare with

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the smell at Mr. Williamson's house?—Nothing of the kind to-day.

9393. If there was sickness in Mr. Williamson's house, would not the smell on the premises immediately adjoining be more likely to be the cause than any smell arising from the irrigation works?—No, for both the smells are in the external air, and not confined within the walls of the house.

9393*a*. Were there not windows close to the bad smell?—Yes, near.

9394. Might not the foul air enter the house through those windows?—It might do so certainly, but at that corner I scarcely think there is a window.

9395. (*Chairman.*) Should you say that the cause of disease must be something within the four walls of the house, rather than external to it?—I think so.

9396. If you let the foul gases be liberated within the house by any means, their influence will be felt more powerfully upon the nerves and upon the system than anything that could be brought in from the outside?—There is no doubt about that, and the more they are confined the worse they will be.

9397. (*Professor Way.*) In looking for the cause of any disease at South Norwood, should you consider it your duty to exhaust every other cause before you attributed it to the irrigation works?—I do not know that. I might look for a cause, but I know that in those irrigation fields I have found the stench so bad and the sewage so black, that it was impossible to stay near it.

9398. (*Mr. Harrison.*) When was that?—When I went down there to look them over.

9399. Do you remember the exact time?—No. It was very near to the building where they let the sewage out.

9400. (*Chairman.*) Was that at a time when they were cleansing the tanks?—I believe it was at a time when they allowed that they had failed, and that the scheme did not answer.

9401. (*Professor Way.*) And not in the ordinary condition of things?—No.

9402. (*Mr. Harrison.*) I believe you only experienced this on one occasion?—There.

9403. (*Chairman.*) Have you been down to the works to day?—Yes.

9404. Did you see the sewage water coming down from that tank to day?—Yes.

9405. Did you go to see the water as it came off the land?—No.

9406. Did you smell anything to-day?—No.

9407. Nor in the tank-house?—No.

9408. Nor in the black material anything that was offensive?—No.

9409. (*Mr. Harrison.*) Did you go into one of those houses in Eldon Square?—No; but I know that they are sometimes in a filthy condition.

9410. Are you aware that the privy is in the lower basement without any outlet?—Yes, I believe so.

9411. All the foul gases must necessarily go into the house?—Yes, and I have been surprised that there has not been more sickness there.

9412. Is not that place likely to become a hotbed of sickness?—I think that if hot weather were to set in it is very likely; but the high strong winds carry the smell away, and it is the same with the sewage works. When there has been no wind and I have been passing along the Harrington Road, I have smelt the sewage very strongly; but then when there is a wind blowing the smell is blown away.

9413. Upon that particular night and at the particular spot where you smelt the smell it appears that there was still remaining part of that foul ditch uncovered?—Not the one at the bottom of the freehold ground. I may add that I had another case of fever, a second attack, in a little boy about six years old, Master Simmonds; but he has got well; that was a case very similar to the one I spoke of at the Willows; it occurred in a fine large healthy house where there was no impure drains. I know that Mr. Simmonds has laid out a great deal of money to make the drains all perfect.

9414. (*Chairman.*) In the last autumn and winter cases of fever have been very prevalent throughout Great Britain?—Yes.

9415. Fever has been epidemic?—Yes.

9416. There have been very many more cases in London than usual?—Yes.

9417. At Liverpool the public health has been very bad?—Yes.

9418. And I suppose you find, by experience, that at particular seasons, from causes which you cannot always explain, that there is a greater prevalence of fever than at other times?—Yes. I have seen the worst and the most rapid cases of scarlet fever this year that I ever saw in my life; in one case four children were carried off in one family.

9419. You will not be, perhaps, surprised to hear that sewerage and drainage and water supply do not seem to be capable of protecting people from scarlet fever?—No, they do not; there is no doubt that the poison is in the air.

9419*a*. There may be a modified type of it which will come, although you have done your best to prevent it?—Yes.

9420. (*Mr. Harrison.*) You heard what Dr. Sutherland stated as to the number of deaths which had occurred in Norwood in the last 12 months?—Yes, that there had been only four.

9420*a*. And that in the last three months there had been only one death?—Yes; speaking of typhoid fever, there was one in the Harrington Road some weeks back, and one in the Freehold Ground.

9421. (*Chairman.*) Do you think that the Board of Health has been the means of doing any good or not in South Norwood?—Yes, I think they have been the means of doing good because they have given us better drainage; we have large sewers now that we had not before. I think that there is only one fault about the sewers, and that is, that they are too large. I think that hard-baked piping is a great deal better than brick sewers, and for this reason: if you had the pipe only large enough for the quantity of sewage that is to flow through it, the foul gases would not accumulate; for the moment you flush a drain so that it will carry no more, you carry everything away; but if you get a larger sewer than is necessary, gases always rise up in it.

9422. (*Mr. Harrison.*) I believe you are the partner of Mr. Cresswell?—Yes.

9423. You heard his description of the peculiar type of disease in some of the cases which he had attended. Have you observed anything different in recent cases from what you have been accustomed to see in previous cases?—No.

9424. So that there was no peculiarity in the cases which you could attribute to the carrying out of the irrigation works?—No. The most extraordinary thing is what I have observed in the case of cholera; and I suppose I had more practice in it in 1849 than almost any man in London. You may have a court not above 20 feet wide, and every house on one side will be attacked with cholera, and on the other side there will not be one case. I think that shews that cholera goes, as it were, in streaks of the air. In another instance, in a street, you will have it in a centre house on one side, and also in the centre house on the opposite side, while both the ends of the street are perfectly pure.

9425. (*Chairman.*) Have you anything further to add?—No.

The witness withdrew.

The *Chairman* inquired of Mr. Lowe whether he had any further advice to offer.

Mr. Lowe stated that he had letters from some of his tenants which perhaps he might be permitted to read before the close of the meeting.

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Mr. HENRY SMITH (of Eldon Park, South Norwood) examined.

9426. (*Chairman.*) Where do you live ?—In Beaufort Villa, Eldon Park.

9427. How long have you lived there ?—10 years.

9428. You know what the district was before the Board of Works was established, and what it has been since ?—Certainly.

9429. What is your opinion as to the relative condition of things ?—Of late, since the irrigation scheme came into operation, I have smelt at the front of my house, when the window has been open, an unpleasant odour, which I have attributed to those works. I do not know whether it was from that.

9430. Previously, did you ever perceive an unpleasant odour in or near to your house ?—Certainly not.

9431. Not from the canal behind ?—Yes, occasionally I did from that.

9432. Or from any ditches or foul sewage in the open channels about your house ?—Not in the house, but when I have walked across the fields of course I did.

9433. Or from any of the roads that are there undrained ?—I did not smell the ditches when I was in the house ; it was only when passing them.

9434. You do not imagine that on certain occasions you have perceived a smell from the irrigation works within your house ?—Yes, I have, particularly in the mornings and in the evenings ; not in the middle of the day.

9435. Has it had any effect upon yourself or any of your family so as to cause any serious illness ?—No, I cannot say that.

9436. It has, in your case, been merely an annoyance ?—Yes.

9437. (*Mr. Harrison.*) The foul ditches in the neighbourhood of the sewage works I believe have been filled up ?—Yes, within my experience.

9438. When formerly you walked in the neighbourhood where the sewage works are now, did you find any disagreeable smell from those foul ditches ?—Yes, certainly, very great.

9439. Was the smell from those foul ditches greater than you perceive from the irrigation works now ?—Yes, it was more condensed.

9440. Do you think that when the wind blew from that neighbourhood towards your house, the effect of that condensed smell was greater ?—No smell ever reached my house until those irrigation works were commenced. I never used to smell the ditch until I crossed it.

9441. (*Chairman.*) How frequently have you been annoyed with this smell which you think comes from the irrigation works ?—I can hardly say ; generally speaking it has been in the morning when I have thrown up the window to get fresh air.

9442. That would be when the wind was blowing in your direction ?—Yes, I suppose so.

9443. What wind would that be ?—It must be a south-east wind to carry it to my house, or south-east and by east.

9444-5. Is there not an open ditch containing sewage within 30 yards of your house now ?—I am not aware of it.

The *Chairman* inquired whether Mr. Lowe wished to put any questions to the witness.

Mr. Lowe stated that he did not ; but with the permission of the Chairman, he wished now to have some letters read which had been addressed to him as ground landlord by some of the tenants of the houses.

The *Chairman* stated that the letters might be read. Two letters were then read.

The witness withdrew.

Mr. J. Hempstead.

Mr. JOHN HEMPSTEAD (of South Norwood) examined.

9446. (*Chairman.*) Are you a resident in Norwood? —Yes.

9447. How long have you been resident ?—20 years.

9448. Has Norwood grown in population ?—Very much so.

9449. Was it ever worse in its sanitary condition than it is now ?—Very much so ; we had neither water nor drainage when I first came.

9450. Do you consider the Local Board of Health have improved the district ?—Very much so.

9451. You do not object to some few persons holding a contrary opinion ?—No, not if they state it fairly.

9452. They have a right to hold a different opinion ? —Yes, if founded on truth, not otherwise.

9453. Have you been over the grounds that have been irrigated ?—Yes, twice.

9454. Did you perceive anything offensive there ?—No.

9455. Do you live where the wind could blow a smell to you ?—No.

9456. You would not say that the gentlemen who have complained of having smelt the irrigation works in their houses are wrong ?—I mean to say that I smelt nothing when I was down there.

9457. But they may have smelt something for anything you know ?—It is just possible. Those who knew the state of the open ditch when all the sewage flowed over it would know that it was a perfect nuisance. You got quite sick then, and the water used to pass into the estate opposite (General Cator's), and I was rather surprised that he submitted to it as he did, for then the ditch was as black as ink, and the water that flowed down to Lewisham was polluted beyond measure.

9458. Now all that cause of pollution has been removed ?—Yes, and the greatest improvement has been effected within the last few years.

9459. (*Mr. Harrison.*) Has the value of the property in this neighbourhood increased ?—Very much so. I consider that the value of property has increased not only here, but all round, quite 40 per cent.

The witness withdrew.

Mr. Swan stated that two letters had just been placed in his hands from two residents to shew that the complaints made by his clients were not groundless.

(*Two letters were read.*)

Mr. Swan stated that the object of his clients was to lay before the Commissioners exactly what the complaints made were, and to bring to their attention what his clients considered to be a nuisance, which affected the health of themselves and their families, and also had the effect of depreciating the value of their property. That his clients were the owners of considerable freehold property in South Norwood, and they found that their tenants were leaving the place entirely in consequence of the smell which arose from the irrigation works, and persons were withdrawing from a neighbourhood which they believed to be not salubrious.

Dr. Carpenter.

Dr. CARPENTER (of Croydon) further examined.

9460. (*Chairman.*) You desire to make some observations to the Commissioners ?—Yes. I have known this district for 15 or 16 years, and for the first 10 years of that time I was in frequent attendance upon parties living in this neighbourhood—in Eldon Park and Albert Road. During that time I attended many cases of typhoid fever there, and some were fatal. Latterly I have not attended, except in consultation, any cases there, because I have given up this district since the retirement of my late partner. During the last year I have seen three cases of fever in consultation in this neighbourhood, and they were

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precisely of the same type as those which occurred here 10 years ago; I mean of the typhoid type. My impression is that by the works which the board of health have carried out the health of this district has been materially improved, and I wish to state one fact which Dr. Sutherland did not mention, and which brings with it some comfort for the inhabitants of Norwood. There is no doubt that the last 12 months, as regards Norwood, have been a healthier time than they have ever had before. From a return, which I will hand in, it appears that the mortality in Norwood during the past 12 months has been but 18 in 1,000. Dr. Sutherland told you that there had been only four fatal cases of fever. The average mortality for 10 years of the whole parish of Croydon has been also 18 in 1,000; but during the past year the mortality for all England has been 23 in 1,000; in the country districts of England it has been 19 in 1,000; in the parish of Croydon it has been 21 in 1,000, and in the town districts it has been 25 in 1,000. So that the fact appears to be that Norwood itself has for healthiness beaten all England. It has beaten the country districts, it has beaten the parish of Croydon, and it has beaten the town districts. The mortality has been positively lower than on almost any previous occasion.

The following Table was handed in marked A.

MORTALITY TABLES, &c., for the Parish of CROYDON, from January 1st 1865, to December 31st 1865, inclusive.

Diseases.	1864.	Average, 10 years.	1865.	North.	East.	South.	West and Central.	Norwood.	Union House.
1. Fever - - - -	27	18·1	52	16	1	5	22	4	4
2. Cholera - - -	0	0·3	1	1	0	0	0	0	0
3. Diarrhœa - - -	43	20·8	47	11	0	5	24	7	0
4. Dysentery - - -	0	0·8	1	0	0	0	0	1	0
5. Scarlatina - - -	23	19·5	37	10	0	4	8	15	0
6. Small Pox - - -	12	8·7	6	0	0	0	4	1	1
7. Measles - - -	6	8·8	24	8	0	2	12	2	0
8. Whooping Cough - -	30	16·6	21	2	0	2	15	2	0
9. Erysipelas - - -	5	5·3	8	2	0	0	3	3	0
10. Disease of Heart - -	53	34·7	54	14	1	9	22	4	4
11. ,, Respiratory Organs	201	146·5	218	64	11	27	65	32	19
12. ,, Brain - -	92	65·6	81	15	3	6	35	10	12
13. ,, Liver - -	21	15·9	21	5	1	2	8	5	0
14. ,, Kidneys - -	14	7·6	23	7	0	2	10	2	2
15. ,, Abdomen - -	62	35·1	68	17	2	5	29	7	8
16. Dropsies - - -	11	4·8	2	2	0	0	0	0	0
17. Convulsions - - -	43	25·0	43	11	0	5	19	6	2
18. Specific Diseases - -	36	35·2	32	7	1	2	9	4	9
19. Other Diseases - -	94	81·1	120	25	4	7	52	14	18
20. Accidents - - -	21	15·4	21	8	3	0	7	2	1
	794	665·8	880	225	27	83	344	121	80
Per cent. per annum -	2·097	1·845	2·126	1·997	0·730	1·997	2·615	1·817	

18.—Cancer, and other malignant Diseases. 19.—Old Age, Natural Decay, Debility, Premature Births, &c.

MORTALITY per Cent. per Annum for the Year 1865.

From the Registrar-General's Quarterly Return.	Average of 10 Years.	Year 1865.
* In the Town Districts of England - - -	2·412	2·543
* In the Country Districts of England - - -	1·885	1·927
* All England - - - - - - -	2·216	2·341
In Parish of Croydon - - - - -	1·845	2·126

POPULATION TABLE.

Year.	Population by Census.	Estimated Population.	Inhabited Houses.	Vacant Houses.	Births for the year.		
					F.	M.	Total.
1851	20,355						
1861	30;229						
1864		37,862	6,585	140	637	664	1,301
1865		41,382	7,197	325	712	756	1,468

Mortality at Comparative Ages.											Weather.			
Year.	All Ages.	F.	M.	Under 2 yrs.	2 to 10.	10 to 20.	20 to 40.	40 to 60.	60 to 80.	Above 80.	Mean Temperature.	Rain-fall.		
												In.	10.	100.
1864	794	402	392	251	72	19	121	133	161	37	49·39	18	0	2
Average 10 Years	565·8	277·2	288·6	164·7	69·3	28·1	77·9	85·0	107·7	33·1	49·52	24	9	8
1865	880	440	440	268	112	43	120	134	154	49	50·48	31	4	7

Year 1864 - - - - -	2·097
Ditto 1865 - - - - -	2·126
Average 10 Years - - - -	1·845

Northern District, including Norwood - -	1·997
Norwood only - - - - -	1·817
Eastern District - - - - -	0·730
Southern ditto - - - - -	1·997
*Western and Central ditto, including Union House	2·615

Deaths in the Union House - - - 80.

* Without Union House - - - 2·121.

1,004 Notices for new Houses were approved in the Year, and 612 were added to the Rate Books.

E. WESTALL, M.D.,

For Local Board of Health.

February 1866.

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9461. (*Professor Way.*) The account that you have given of the general mortality would hardly afford great consolation to these gentlemen if they really have a nuisance to complain of in one particular spot?—That is true.

9462. (*Chairman.*) Did you hear Mr. Cresswell give his evidence?—Yes.

9463. Have you, in your practice, which has been extensive, met with any cases of malarious fever, of which he spoke?—I have met with cases of fever, but I do not recognize the distinction which he drew between malarious, intermittent fever, and ague itself.

9464. Have you ever met with a true case of agueish disease in Norwood parish?—No.

9465. Such a thing may have occurred?—Yes.

(*Mr. Cresswell.*) I wish to say, in reply to what has been stated as to the mortality of South Norwood, that although South Norwood is in an excessively healthy state, still we must not take what has been stated as facts, because a great portion of the sick, when attacked here, are sent away to Croydon, there is no Infirmary in the place. Accidents also have a great deal to do with the result shown by the returns. I have this week signed four death certificates from accidental causes, and in the next three months I may not have to sign two.

9466. (*Mr. Harrison to the witness.*) Did you accompany the Commissioners this morning to Eldon Park?—Yes, I went all over it.

9467. Did you go to Mr. Williamson's house?—Yes.

9468. Did you go into the area adjoining?—Yes.

9469. Did you perceive a smell there?—Yes.

9470. Do you think that that was in any way likely to cause disease?—Similar smells have produced disease in Croydon, and upon the removal of those causes the effects have ceased.

9471. (*Chairman.*) Have you anything further to add?—No.

The witness withdrew.

Mr. Castledine, a Member of the Board of Health, stated that he wished to bring before the Commissioners the man who had looked after the sewage works at Croydon from the commencement, and had worked upon the grounds.

PHILLIP DAVY (of Croydon) examined.

P. Davy.

9472. (*Chairman.*) You work for the Local Board of Health of Croydon?—Yes.

9473. Have you had to empty the tanks occasionally?—Yes.

9474. Have they ever caused you to be sick?—No.

The witness withdrew.

BALDWIN LATHAM, Esq., C.E., further examined.

B. Latham, Esq.

9475. (*Chairman.*) Will you describe what state this district was in before your irrigation works came into operation?—There were two schemes proposed for dealing with the sewage of South Norwood, one of which was considered to be an expensive scheme, to erect pumping machinery here to pump the whole of the sewage to Beddington, and the other the present system. I believe then that a public meeting was held at South Norwood, to consider which scheme the inhabitants would adopt, and it appeared that they preferred the scheme to have the works here, as the cheapest and best.

9476. I presume that the Local Board which acts for South Norwood has no desire to do anything contrary to the wishes of the South Norwood people?—Not in the slightest degree. If they come and say that these works are injurious to them, I have no doubt that the Local Board will remove the sewage to some other point; but this must be borne in mind, that it would have to be done at the cost of the people of South Norwood. Norwood is represented by three members at the Local Board. I may also mention that before the works were established we were threatened with an injunction by General Cator and by the people living down the stream for fouling the water. Of course something must be done with the sewage, it is absolutely necessary that the Board should adopt some scheme.

9477. General Cator is the owner of the land where the irrigation works are?—Yes.

9478. He is also the owner of the land in this neighbourhood?—Yes, he owns the land all about, which is now to be let for building purposes.

9479. The owner in fee of the building land in the neighbourhood lets you have this land for irrigation purposes?—Yes.

9480. Have the representatives of South Norwood taken up this matter at your Board?—I believe that the representatives of South Norwood are satisfied that the irrigation works are no nuisance to the place.

9481. Officially there has been no objection made by them of the works?—None; but several complaints have been made of the state of certain places, especially at South Norwood; and when the cases of fever occurred in Lower Albert Road, in each case without exception that disease could be traced to some local cause, and when the cause was removed the disease disappeared. In the case that was referred to by Mr. Baker, and which was a fatal case, there were two open ditches containing foul sewage round that house—one within a few feet of the door, and the other at the back of the garden. The land there had been let for building purposes before any system of drainage had been carried out, but the drainage was begun in the last 12 months, and the ditches were speedily done away with. The drainage is not completed yet, but the Board have it in contemplation in the ensuing spring to carry out very extensive works, and we have been concentrating our attention more upon South Norwood than upon any other part of the district, and eventually it will be the best drained district that we have.

9482. (*Professor Way.*) How many months have these works been in operation?—About 15 months. We began to utilize the sewage last November year; we had to turn the water over the ploughed land. The land was only sown in the early part of November, 1864.

9483. Supposing there is or has been any ground for the objections made to the works as a nuisance, do you think as you go on you may remove that ground of complaint?—Yes. There was cause for it some few months since, and I believe complaints were made of the state of the filtering works, for it so happened when they were constructed that the contractors did not do justice to them, and the result was that when the filters were filled the water escaped, and to remedy that it became necessary to divert all the sewage outside the building, and during that time when it was in the open tank we had some complaints; but we have not had one since officially or in any other way. That was during last summer.

9484. In the spring or the summer?—In the early part of the summer.

9485. (*Mr. Harrison.*) Could you have obtained land at a greater distance from South Norwood?—I do not think it was possible, there is an intervening parish, and not merely that, but a county—part of the land is in the county of Kent, and other part is in Surrey. If the Board could have got land at a distance they would not have refused to carry the works

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a few hundreds further away, but they could not get land, and we are only too much obliged to General Cator for letting us have this land at the excessive rent that we pay for it. I may mention that previously to the irrigation works being carried out, the sewage outfall was very much nearer to the houses in question than it is now.

9486. (*Mr. Harrison.*) And the sewage was comparatively stagnant?—Yes, it was just as black as ink, as stated by the previous witness.

The witness withdrew.

Mr. J. Adland.

Mr. JOSEPH ADLAND (of South Norwood), examined.

9487. (*Mr. Harrison.*) Where do you reside?—In Albert Road, South Norwood, Eldon Park Lodge.

9488. Is that situate between Eldon Park and the sewage works?—Yes, it is on one side of it, opposite Mr. Williamson's house.

9489. Have you perceived at any time any offensive smells from the irrigation works?—Not at our house.

9490. Have you had any illness in your house?—None at all, no case of fever that could be attributed to the works.

9491. (*Chairman.*) You do not join with those who are opposed to the irrigation works?—I have to complain of the bad smells that we find in going across the fields. It used to be our pleasantest walk, and now we avoid it on account of the smells from the irrigation works.

9492. Have you perceived a smell when you have gone across that footpath?—Yes.

9493. (*Professor Way.*) Has it come from the fields or from the buildings?—It was at the footpath, sometimes I have gone across and found very little, at other times it has been very offensive, and it appeared to me that they were letting the sewage run through the open trenches instead of passing it through the filter works—that is, that it was unpurified sewage.

(*Mr. Latham.*) I have stated before that we intend to put pipes into those main carriers.

(*The Witness.*) That would remove that part of the nuisance.

The witness withdrew.

Mr. S. Cousins.

Mr. SAMUEL COUSINS (of South Norwood) examined.

9494. (*Chairman.*) How long have you rented the land which is irrigated?—12 months.

9495. What weight of crop per acre have you taken off the land?—There has been a difference, some acres have produced as much again as the others.

9496. What has been the largest and the smallest quantity?—The least would be about 12 tons to the acre, and the largest about 50 tons.

9497. How much per ton do you usually get for the green grass?—About 1*l.* a ton.

9498. Then the acre that yielded 50 tons would bring you 50*l.*?—Yes.

9499. You have some under-cutting now?—Yes.

9500. How much per rod do you get for that?—We cannot get it off, we sell it at about 4*d.* a rod.

9501. But in the summer time when it is in the best condition, you would get about 1*s.* per rod I suppose?—Yes.

9502. Do you ever get more than a shilling?—I may have got a trifle when it has been much better.

9503. 1*s.* a rod would make, I think, 8*l.* per acre?—Yes.

9504. What has been the greatest number of times in the year that you have got a crop?—Six times.

9505. Do you ever find any smell in the open ditches?—None; at least when I say never, I could say that I did last year in one part of the year.

9506. Did that arise from a cause that you can prevent in future?—Yes.

9507. What was that cause?—The sewage was being turned off from the filter-house on purpose to empty it, and came down thick.

9508. And with a foul smell?—Yes.

9509. That was a smell from matter of many months' accumulation, and not from the ordinary daily sewage?—Yes.

9510. Can you prevent that in future?—Yes.

9511. Do your men suffer in their health?—Not in the least.

9512. Do any of your customers who come to buy the grass complain about the smell?—Not in the least.

9513. Have you many customers who come during the summer?—Yes, a great many.

9514. Have you heard any persons complain of a smell when crossing that footpath?—I have not heard any one complain, except just the first time.

9515. They did complain then?—They did.

9516. Is it not quite possible that persons may have complained in walking across that footpath?—At that time they might.

9517. But not now?—I do not think they can, not even now, although the sewage is now flowing over it.

9518. Would it not be better to prevent their complaints, to pipe your ditches and cover them over?—Yes.

9519. Could you work the sewage just as well if they were closed conduits?—I believe so, but I am not certain.

9520. If you found there was a smell, would you say that it came from the open carrier or from the surface of the land?—From the open carrier.

9521. (*Mr. Harrison.*) What should you say was the average quantity of grass that you obtained per acre?—The irrigation has only been at work one year and for the first year we could not calculate the average, some of the land was sown in November, and the rest was sown in April.

9522. Looking at the grass in its present condition, is there a prospect of your obtaining as much as you did last year?—Yes, and a great deal more.

9523. Is the crop growing more regularly over the land than it did last year?—Much more regularly.

9524. Do you anticipate that you will get this year over all the land anything like the maximum quantity that you got last year over part?—I calculate to grow 50 tons to an acre all over the land.

9525. (*Chairman.*) You began with the land like a bare clay field?—The greater part of it.

9526. You have sown Italian rye grass, and have brought it into its present condition?—Yes.

9527. If you had a choice of soils as between your own and a gravelly soil, which should you prefer?—The clay.

9528. Would you exchange your land for the same area on Mr. Marriage's farm?—No.

9529. You think you are in a better position than he is?—Yes.

9530. Is Mr. Marriage of the same opinion?—I do not know.

9531. (*Mr. Harrison.*) Is the land sub-soiled and drained?—Very little of it.

9532. Do you consider it desirable or not to drain land to which sewage irrigation is to be applied?—If we did drain, it would be merely in places where we got too much water. It might then be useful to have drains that might let the excess of water off, and in summer time we should stop the drains, but as it is we do not find too much water.

9533. (*Chairman.*) Can you always turn the water off as well purified as it was to-day?—Yes, always.

9534. Throughout the year?—Yes.

9535. You think that the water need never be much fouler than it is now?—Never.

9536. Is any discoloration that may be perceived in

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it now more caused by the washing of the clay than by the sewage that remains in it ?—Decidedly.

9537. There may be a little brownish discoloration from the washing of the clay ?—Yes.

9538. And there would be less discoloration if the drains were piped and not open clay channels ?—Yes, and if more water were flushed down in the summer time.

9539. Have you anything further to say ?—I should like to speak as to the health of the people so handy to the place. I had had the filter-house before I purchased it of the parish. I had it for three years, and I worked in it myself. I should think I was in it for 12 hours out of every 24 for weeks, and at last I bought the house and pulled it down. I pulled up all the saturated bricks from the bottom, and built myself a house with it, and I live in that house now.

9540. Can you give any reason why one particular plot only produced 12 tons when the others produced 50 ?—Because we sowed it so very late, and a great deal of cadlock came up, and we had to mow that off before we could get a crop at all.

9541. What is cadlock ?—A weed.

9542. The land was barren, not from any defect in the soil, but because it had not had the same chance as the rest ?—It had no sewage whatever.

The witness withdrew.

Mr. Hovenden stated that some few months ago, in consequence of the prevalence or imagined prevalence of ill health in this neighbourhood, a Committee had been formed to confer with the Local Board of Health, and to urge upon them such measures as were deemed necessary to improve the sanitary condition of the neighbourhood. That the meeting was very largely attended, but it at last dwindled down to nothing, although some very valuable suggestions were made. That the evening before the Committee had been revived, and a resolution was agreed to unanimously, which, with the permission of the chairman, he would read.

The resolution was read.

Adjourned.

Victoria Street, Friday, 2nd March 1866.

LONDON.

S. Gurney, Esq., M.P.

2 Mar. 1866.

LETTER from the SECRETARY of the RIVERS COMMISSION to SAMUEL GURNEY, Esq., M.P.

Rivers Commission,
2, Victoria Street, Westminster, S.W.,
Feb. 15, 1866.

SIR,

I beg herewith to send you a copy of the Royal Commission for inquiry into the best means of preventing the pollution of rivers.

The Commissioners have been engaged in investigating the effect of the sewage irrigation works at Beddington, and understanding that you are a resident in the neighbourhood, and that the river Wandle, after receiving the effluent water from the irrigated meadows, passes through your grounds, they would be much obliged if you would kindly give them the benefit of your experience.

The points upon which the Commissioners would especially wish to have information from you are as follows:

(1.) Whether, at any time of the day or at any period of the year, any unpleasant smell or noxious exhalation rises either from the irrigating water or from the irrigated meadows, so as to cause a nuisance to yourself and others on your estate.

(2.) Whether the effluent water renders the stream into which it flows turbid, or impure, or unwholesome for fish, or unfit for ornamental or mill purposes or otherwise ?

(3.) If any nuisance ever existed from the irrigation works, whether such nuisance has since been abated, and

(4.) Generally whether your first anticipations as to the probable effect of the sewage irrigation works upon yourself, your estate, and your stream, have been confirmed by your further experience ?

I am, &c.
(Signed) GODFREY LUSHINGTON.

Samuel Gurney, Esq., M.P.,
&c. &c. &c.

The following Evidence of SAMUEL GURNEY, Esq., M.P., was tendered in reply to the letter of the Secretary of the Rivers Commission, on the Croydon Sewage Irrigation at Beddington.

As to whether at any time of the day or any period of the year we are annoyed by bad smells arising from the river and irrigation water ?—Yes, frequently, particularly in the evening and very perceptibly along the road leading to Beddington Corner and Mitcham. On Sunday, the 18th February, it was very bad.

Whether the river is rendered impure and turbid, unwholesome for fish, and unfit for ornamental or mill purposes or otherwise ?—I can safely say that the river is rendered turbid and impure by the sewage water. We never had so few fish (but whether in consequence of the sewage water or otherwise I cannot say). The ornamental character of the river is much deteriorated from its impurity and frequent exhalations, and is rendered quite unfit for drinking or culinary purposes.

As to the anticipation of probable effect upon the property ?—This is a most important matter. Had I supposed that the sewage water would not at all times have been thoroughly purified I should never have agreed to its discharging itself into our river. It never has been purified thoroughly for long together, and it varies almost every day in quantity and quality and has put one to very considerable expense in extra draining upon the adjoining field. It is becoming a very doubtful question whether the good we get by the reinforcement of power in our mill stream is not more than counterbalanced by the impurity and smells we suffer by. The value of the freehold building land and frontage opposite the sewage field is deteriorated and rendered much less valuable (Dr. Shorthouse will prove) for building sites. Mr. Reynolds' family has also suffered from gastric diarrhœa, during the progress of the irrigation system. Mr. Reynolds and others have constantly complained to the local board respecting the nuisance. I consider that if the sewage was used on the land with more care and extended over a sufficient area the nuisance would be much abated.

Victoria Street, Saturday, 3rd March 1866.

PRESENT:

ROBERT RAWLINSON, ESQ., C.B., IN THE CHAIR.
JOHN THORNHILL HARRISON, ESQ. | Professor JOHN THOMAS WAY.
GODFREY LUSHINGTON, ESQ., Secretary.

LONDON.

F. W. Shields, Esq.

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FRANCIS WEBB SHIELDS, ESQ., examined.

9543. (*Chairman.*) You are a civil engineer?—I am a member of the Institution of Civil Engineers. I am engineer to a scheme which is now in Parliament and which proposes to deal with the sewage of the towns of the Upper Thames.

9544. Have Parliamentary notices been given for that scheme?—Yes, and the standing orders have been complied with.

9545. Will you briefly describe what induced you to take up the scheme?—I have paid for some time past a great deal of attention to sewage.

9546. Have you inquired as to the several places in which it has been applied such as Croydon and other towns?—Yes, and I last year laid a scheme before the Metropolitan Board of Works for the utilization of the sewage of the south side of London. Following out that thought it, was next proposed to purify the Upper Thames from the pollution now carried into it by the sewage of the various towns on its banks, and this plan is the realization of that idea.

9547. How high do you go up the Thames?—The highest town proposed to be dealt with is Oxford.

9548. Have you examined the Thames above Oxford at all?—No.

9549. Nor any of its tributaries?—No.

9550. In the event of this scheme receiving Parliamentary sanction and succeeding commercially, do you think it will be enlarged so as to take in other towns above or any towns on the tributaries?—I have not investigated the question sufficiently to say. Generally speaking, if sewage utilization is to be carried on as a commercial undertaking, a town with a considerable amount of population is to be preferred.

9551. Is your scheme connected with any patent?—No.

9552. All is open?—Yes.

9553. If your works prove successful they will serve as examples for other places and there will be nothing to hinder those places from following it?—No.

9554. I suppose you anticipate success?—I do. I have every reason to believe that the scheme will be a successful one and will meet with the approval of the Government.

9555. It is your object and that of the promoters acting with you to make it commercially successful?—It is.

9556. Have you seen any of the Government authorities with respect to any portion of this scheme for which you have given Parliamentary notice?—I had a communication from the Honourable Charles Gore's office inquiring whether the scheme affected any of the Crown property at Windsor. I saw the chief clerk in his office who decided that none of the Crown property was affected by the scheme. Within the last week I have had a communication from the First Commissioner of Her Majesty's Works, the Right Honorable W. Cowper, inquiring whether the scheme would cause any nuisance or annoyance to Her Majesty's residence at Windsor. I waited upon Mr. Cowper in consequence of this communication, and we fully investigated the matter, together with a gentleman who knew the locality—I think Mr. Starie,—and I explained my scheme fully to them as far as Windsor was concerned. Mr. Cowper and he stated that the arrangement proposed to be made at Windsor were perfectly satisfactory to them and that they saw no reason to interfere with them

9557. Have you seen any other parties connected with the Government?—No others.

9558. Did Mr. Cowper or Mr. Starie or the Honorable Charles Gore say anything to you about a scheme that had been prepared by Mr. Menzies?—No.

9559. Have you seen Mr. Menzies?—No. I wrote to him previously, having understood that he had a scheme to which he had paid a deal of attention, and I proposed to see him, but he replied that he did not know whether the Commissioners of Woods would approve of his doing so.

9560. You wish to hand in a plan?—Yes. This is an index plan of the scheme called the River Thames Purification, showing the whole of the towns proposed to be dealt with and the localities in which our pipes and works are to be situated.

9561. I suppose it is a copy of the sheet in the deposited plan?—It is a copy of the Index Parliamentary Plan.

9562. In your deposited plans I assume that you have surveys of the red plots on the plan and that you have run sections over the intervening lines?—We have.

9563. (*Mr. Harrison.*) Those plots, I presume, correspond with the quantities you have given as to be purchased?— We have included those quantities coloured red within our limits of deviation, but they exceed the quantities that we propose to purchase. We thought it well to allow ourselves a little latitude in selecting the sites.

9564. (*Chairman.*) You have got a margin for the limits of deviation round your plot?—Yes.

9565. (*Mr. Harrison.*) If your bill is passed will it enable you to purchase the whole extent of the land that is marked?—Within the limits of our capital it will.

9566. Can you give us the area of those red plots?—732 acres. We propose to take 605 acres.

9567. (*Professor Way.*) For a population of 177,000 persons?—Yes, it is about 1-6th of the total quantity which the sewage proposed to be dealt with can irrigate with advantage.

9568. Do you mean to take compulsory powers for that quantity?—Yes, and as to the remaining 5-6ths we trust to future arrangements to get them into operation.

9569. (*Mr. Harrison.*) Can you state how much land is included within your limits of deviation in the case of each town?—I have not got the quantities with me.

9570. (*Professor Way.*) You mean to say that you have only put 605 acres as the total you are to acquire compulsorily, but that your limits of deviation will enable you to acquire more than that?—Yes, we estimate on taking 605 acres, but our limits of deviation show an area of 732.

9571. (*Chairman.*) Is it not the fact that if Parliament passes your plan with the limits of deviation upon it, you are not restricted to the actual quantity given notice of, but you can purchase the whole?—Yes; the compulsory power extends over everything in our limits of deviation.

9572. (*Professor Way.*) In the case of Kingston you put down 40 acres as what you expect to take under your powers. Are those 40 acres the whole over which you will have control, or will there be a larger quantity?—It is not the whole of that which lies within our limits of deviation. Our Parliamentary plans include a larger quantity of land than the 600 acres. We have done so in accordance with the usual practice in railway and other works of the same character—viz., scheduled a larger quantity of land than we require.

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9573. Do you consider that 605 acres are a proper quantity of land on which to distribute the sewage of 177,000 people ?—No, it is only about one-sixth of the quantity of land which can be profitably irrigated by that sewage.

9574. Do you trust to getting the rest of the land without compulsory powers ?—Yes, we do; that is our proposal.

9575. (*Mr. Harrison.*) The 600 acres allow only one acre for the sewage of 300 people ?—Yes, which is one-sixth of the quantity of land which can be profitably irrigated.

9576. Do you trust to people taking the sewage from you ?—We trust either to procure additional land on lease which we can irrigate ourselves, or to sell the sewage to farmers.

9577. Should you not have under complete control a sufficient quantity of land to purify the sewage in each case ?—Yes, we should.

9578. What do you consider that quantity is ?—The 600 acres that we propose to take absolutely is sufficient for that purpose.

9579. (*Chairman.*) That is for mere coarse purification ?—Yes.

9580. (*Mr. Harrison.*) Do you make yourselves liable under the bill to purify the sewage upon that land in case of your not being able to do it otherwise ?—There is nothing in the bill to bind the company to deodorize the sewage, or to pass it over the land so as to purify it. The bill is a permissive one, subject to the approval of the several towns. Without the approval of those towns the Act would be inoperative.

9581. What security is there in the bill that this scheme will be carried out to the advantage of the towns, and not to their annoyance or disadvantage ?—The bill is not compulsory upon the towns ; it is permissive merely, enabling them and us to make mutual arrangements. Before doing so they will of course satisfy themselves as to the completeness of the arrangements which they may make with us.

9582. Is there any provision that in case you carry out the works to a certain extent and then drop them, the works shall fall into the hands of the town authorities on certain terms ?—That will be entirely a matter for subsequent arrangement with the towns.

9583. (*Professor Way.*) Do you expect contributions from the towns towards the works in any way ?—We expect to make arrangements with the towns. In the first place, without their consent we can take no steps at all, and in the second place we expect, considering the great advantage which will accrue to those towns, in getting rid of the embarrassing question and great nuisance of their sewage, that they will co-operate with us in carrying out the objects of this bill.

9584. And help to bear some of the very heavy expense that long line of conduit will cause ?—I am unable to speak to the details of such an arrangement but we expect the co-operation of the towns.

9585. (*Chairman.*) In your estimates have you contemplated paying any royalty to the towns for the sewage ?—I have not, because in every case we shall have to pump the sewage to a considerable height, and there is a considerable diversity of opinion as to the amount of remuneration yielded by the system, even without that rather costly operation.

9586. (*Professor Way.*) For a series of years or in perpetuity do you expect to have a lease of the sewage ?—We must try some experiments for a few years before we can say what the ultimate arrangements will be.

9587. (*Chairman.*) Do you contemplate that the towns will participate in the profits when you receive an income above a certain rate per cent. ?—I think it would be a fair arrangement.

9588. To offer them a participation in the profits after a fixed per-centage has been attained by the company ?—It would be fair in case the towns co-operate in carrying out the objects of the bill in the first instance, but that is a matter for future private arrangement.

9589. (*Mr. Harrison.*) Have you prepared an estimate for your works ?—I have prepared a short statement.

9590. (*Chairman.*) I believe you have drawn up a written statement of the scheme with details ?—I have I hold in my hand a written statement giving a brief description of the scheme.

River Thames Purification.—1. The object of this scheme is to apply the sewage of the various towns situated in the valley of the Thames above London, to the fertilization of land in their several neighbourhoods. 2. The towns referred to are as follows: Richmond, Twickenham, Brentford, Isleworth, Kingston, Windsor and Eton, Reading, Abingdon, and Oxford. 3. The sewage of all these places is at present discharged into the Thames, polluting the river to a most serious extent, and deteriorating the quality of the water supply to the towns in question, as well as to the metropolis. 4. The plan proposed is, to pump the sewage to such a height as will enable it to irrigate by gravitation a considerable area of land, over which the sewage will be applied as manure for raising grass and other produce. 5. This system has been already put into operation in several important towns, and is about to be carried out in the metropolis. 6. The sewage to be dealt with is sufficient to fertilize properly about 3,600 acres; and the company propose to purchase lands in proximity to their several works to the extent of about one-sixth of the quanity required, so as to form a nucleus of operations. The remaining five sixths of the land will be leased, or sewage sold to the farmers for its irrigation. 7. The capital for this undertaking is 250,000*l.*, and it is proposed that this sum shall be raised with the co-operation of the several towns referred to; who thus, by means of the company, will be enabled to rid themselves of a serious nuisance, and to effect a great sanitary improvement. 8. The following is a tabular statement of the main features of these works:—

No.	Name of Town.	Population.	Gallons of Sewage per day.	Height to which Sewage is pumped.	Area over which Sewage is distributed.	Area purchased.
				Feet.	Acres.	Acres.
1	Oxford - - - -	40,000	1,200,000	236	800	140
2	Abingdon - - - -	10,000	300,000	98	200	30
3	Reading - - - -	30,000	900,000	176	600	100
4	Windsor and Eton - -	20,000	600,000	67	400	70
5	Kingston - - - -	12,000	360,000	105	240	40
6	Richmond district, comprising Richmond, Brentford, Twickenham and Isleworth - - - -	65,000	1,950,000	80	1,300	200
	Totals	177,000	5,310,000	—	3,540	605

APPENDIX.

DETAILED DESCRIPTION of the Works proposed at each Town.

1*st. Oxford.*—The sewage, after being conveyed to a point adjacent to the goods depôt of the Great Western Railway will be pumped through an iron pipe along the Cumner Road to a reservoir on Cumner Hill 3¼ miles from Oxford, whence it will be distributed by gravitation.

2*nd. Abingdon.*—The sewage, after being conveyed to a plot of ground called the Close, at the junction of the Berks and Wilts Canal with the river Thames, will be pumped through an iron pipe along the Cumner Road to a reservoir

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near the Sandford Cross Road, about 2⅞ miles from the commencement, whence it will be distributed by gravitation.

3rd. Reading.—The sewage, after being conveyed to a point adjacent to the junction of the rivers Thames and Kennet, on the east side of the town, will be pumped through an iron pipe laid along the Peppard Road to a reservoir on Pottinger's farm, about 2¾ miles from the commencement, whence it will be distributed by gravitation.

4th. Windsor and Eton.—The sewage being taken from the main sewer at the end of Red Lion Row, is carried across the Thames, when the Eton sewage is also taken up, and the whole pumped through an iron pipe laid along the road to Farnham Royal, to a reservoir near Westfield Road, about 3¾ miles from the commencement, whence it is distributed by gravitation.

5th. Kingston.—The sewage being taken from the main sewer at the point of its discharge into the Thames adjoining the railway bridge, will be pumped through an iron pipe laid along the Tolworth and Ewell Road to a reservoir adjacent to that road, about 3¼ miles from the commencement, whence it will be distributed by gravitation.

6th. Richmond District.—The sewage of the towns of Richmond, Twickenham and Brentford, will be respectively pumped through iron pipes to Isleworth, and from thence through a single pipe along the Colnbrook Road to a reservoir adjoining the East Bedfont Cross Roads, at a distance of about 6 miles from each of those towns, whence it will be distributed by gravitation.

9591. That completes the scheme?—Yes.

9592. (*Mr. Harrison.*) If I am not mistaken, you pump the sewage of Reading on to the chalk?—No, it is pumped on to a hill which is composed of clay and gravel; it is a chalk subsoil.

9593. (*Professor Way.*) What depth of soil is there besides the chalk—is it a thin soil immediately overlying the chalk?—There is no chalk appearing in the road excavations within six or seven feet.

9594. (*Mr. Harrison.*) The question is whether, if this is a chalk substratum, you will be able to carry the sewage over the land in the way of irrigation?—The land must be formed so that the sewage shall run rapidly over it; it does not answer to let the sewage lie on the land, as it spoils the crop; and I can say, with safety, that in running over the land with rapidity the sewage would not reach the chalk subsoil.

9595. I see that you propose to provide a reservoir—what is the object of that?—To contain a sufficient supply. Generally speaking, we provide a reservoir to contain about two days' supply.

9596. Is it not desirable to do away with reservoirs and take the sewage directly on to the land as fresh as possible from the towns because anything like stagnation becomes soon the cause of nuisance?—No doubt it is so and we have provided a reservoir more as a matter of convenience than anything else. I dare say that in the course of the ordinary working it would be dispensed with.

9597. Are the reservoirs an expensive part of your scheme?—No.

9598. (*Professor Way.*) In the case of a town from which the flow of the sewage was by gravitation alone you would never think of a reservoir?—No.

9599. Then why should you think of a reservoir after you had pumped to a certain height?—I have no doubt that in working we should dispense with reservoirs, but I thought it safer to include reservoirs in my estimates. I have no doubt that we should apply the sewage directly as it came. The reservoirs that we propose to make are small in extent and it is more with the idea of having a certain amount of sewage collected to enable us to perform our operations with regularity and to give our tenants or our lessees for the sewage the greatest possible advantages, but it by no means follows that they will be used in practice.

9600. I see you have arranged to pump to considerable heights, 230 feet at Oxford and 105 feet at Kingston; was it not possible to have found land in the valley of the Thames suitable for the application of the sewage without pumping to those heights?—The difficulty is that you get into residential property in the neighbourhood of almost all those towns, and, I think, by the arrangements here adopted, we have got rid of that great objection and so avoided a great amount of opposition to our bill and inconvenience to the neigbourhood.

9601. What amount of pumping power have you provided at the different towns?—Double the amount which is actually required.

9602. Have you made any provision for an outlet for this sewage from these lands to the river?—In every case an outlet is provided.

9603. You take land for that purpose?—In every case we take power to lay down drains; generally speaking, the purified water would be discharged into some watercourse, but in every instance that point has been seen to.

9604. Such watercourses do not exist in every place—for instance, in the chalk you may have a large area of land without any watercourses at all?—Yes, but there are hollows, and so forth, where outlets can be found.

9605. If they should not be found you take powers to make them?—Yes. In all cases we have outlets provided.

9606. Take the case of Croydon. The outlet drain at Croydon is a large stream at least three feet wide?—Yes, it is.

9607. (*Mr. Harrison.*) Do I understand correctly that you propose to pump at Twickenham, Richmond, Isleworth and Brentford separately to the same central point, and then to have a second pumping establishment, to pump it up to the reservoir?—Not so. We propose to have separate pumping establishments at the three places, Brentford, Richmond, and Twickenham, and to pump at each of those places into an iron main, and those three mains would unite at Isleworth and the sewage would thence go forward to its final destination. It is not intended to have a second pumping.

9608. (*Chairman.*) How are you to pass sewage into a main that is under pressure?—We must take the Isleworth sewage down to one of these places—the sewage of all the three or all the four goes through the same pipe at the further end.

9609. (*Mr. Harrison.*) What pumping power do you provide?—I have provided double the engine power required in each case.

9610. What is the total horse power that you propose?—334 horse power.

9611. (*Professor Way.*) I see that you have provided for a water supply of about 30 gallons per head of the population?—Yes.

9612. That is the only gauge that you have of the quantity you would have to deal with?—Yes, that is the standard that I have taken. I consider that that is an ample estimate because of there being no factories or anything of the kind which involve a large consumption of water.

9613. (*Mr. Harrison.*) What provision is there in the bill as to obliging you to pump the sewage on to the land?—There is no obligatory provision as to that in the bill.

9614. Supposing you neglected the pumping—what would become of the sewage?—I suppose that the towns, if they came to an arrangement with us, would bind us over to perform the necessary operations to get rid of the sewage; it would be a matter of agreement.

9615. In passing your bill should not Parliament take the precaution of obliging you to pump all the sewage of the town on to the land?—If they also obliged the towns to give it to us, but the bill is permissive on both sides.

6916. If you have power to take the sewage from Reading or from Windsor must you not take upon yourselves the obligation of pumping all the sewage of those towns?—Undoubtedly.

6917. Are the spots which you have selected for your reservoirs spots which are distant from residences of importance?—They are in every case.

6918. Is the land generally at those spots cheaper and more easy to be obtained than land in the valley of the Thames itself?—In every case; it is poor land, not of a residential character and not likely to become

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so; and also in every case it is land having a considerable quantity of gravel intermixed with the soil.

9619. It is generally a free soil?—Yes.

9620. Land that you believe will be suitable for irrigation purposes?—Just so; in fact the distances which these various places are from the several towns show that that is so. The country has been examined all round each town for a considerable radius.

9621. (*Chairman.*) Have petitions been lodged against your bill from any of the towns you have scheduled?—The time has not yet arrived for lodging petitions.

9622. Have you had any personal communication with any of the authorities in the several towns you scheduled?—We have refrained hitherto from doing so.

9623. You have not had direct communication?—Very little. We have considered the matter hitherto to be in too early a stage to put ourselves into communication with the several towns.

9624. You anticipate that there will be several petitions against you in order to give the local authorities a *locus standi* before the committee?—Perhaps so.

The witness withdrew.

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Mr. CHARLES REYNOLDS (Wallington Cottage, Carshalton, Surrey), examined.

9625. (*Chairman.*) I believe you act as agent for Mr. Gurney?—Yes, I manage his landed property, and in fact nearly all his property.

2626. You reside near to the Croydon sewage irrigation works?—Yes, near to the lower outfall at Beddington corner.

9627. Did you reside there previous to the establishment of those works?—Yes, for a long time.

9628. Then you are perfectly acquainted with the condition of things both before and subsequently?—Certainly.

9629. Do you remember the state of the Wandle before the local board was established?—Undoubtedly I knew it perfectly well.

9630. Were there privies over the stream, and did any of the existing drains pass directly into the stream?—Some of the houses close upon the stream certainly discharged into it, and privies were placed over the edge of the bank, and the soil fell into the water.

9631. Did the drains and privies in any perceptible way foul the water?—No, not with us.

9632. Do you remember the establishment of the main sewage works about 1850?—Yes, perfectly well.

9633. Do you remember what came about after those works were opened?—Yes, the river was fouled distinctly, the sewage was delivered into Mr. Chasemore's mill head and it there deposited; so to a certain extent the water became clearer, and then ran away through the mill stream on to us. The sewage made a perceptible alteration in the water at once. We all found the water not so good and people complained that it was not so good to drink, persons near me who had used the water for culinary purposes found that it did not suit and that it was unpleasant—that was the first result of the sewage works.

9634. Did the sewage at any time to your knowledge affect the fish?—I should say not. I do not think it did.

9635. Did the local board subsequently, after the notices had been served upon them, drain into any of the ditches or watercourses above the mill head?—I have been told so and I believe it.

9636. Do you recollect the first steps that were taken by the Croydon local board to attempt the purification of their sewage by using chemicals?—Yes, I do.

9637. Did they succeed?—I think not. I was connected with this river for a great many years as treasurer of a society of millowners and occupiers for the purpose of preserving the purity and the quantity of the water. At that time there existed in Croydon sundry ponds or reservoirs supplied mainly by springs which used to discharge themselves into the Wandle or the Croydon branch of that river, and then we were very particular about the purity of the water, and we used to see that it was pure. After that the thing fell into disuse, and I cannot say anything more about it.

9638. Do you remember the establishment of the Beddington works there?—Perfectly.

9639. Were you a party to the action brought against the Croydon local board to prevent them from polluting the stream?—No, Mr. Bidder was the party, he came down to consult us, and to ascertain whether we would join him. For some reason or other Mr. Gurney did not care to be mixed up in the litigation, and I declined.

9640. Does Mr. Bidder live above you or below you?—Below us, a mile and a half.

9641. If Mr. Bidder found it so great a nuisance as to cause him to enter an action, it must then have been with you a greater nuisance still?—Permit me to explain. At the time when Mr. Bidder brought that action the sewage was discharged in an open culvert across Beddington corner, from the corner of the irrigation land, and we were above it then.

9642. (*Mr. Harrison.*) The action was brought after the sewage was applied to the land?—Yes. This sewage water formed an enormous bank of fœtid mud, just opposite the point where it had discharged itself into the river. Mr. Bidder became cognizant of that fact, and he used to take samples of the water to test its purity, for he had a strong conviction that his fish were killed by the sewage water, or by the chemicals that came down and were contained in the sewage water; any how he lost his fish, and he commenced his action for the loss of the fish and the defilement of the river. I believe he succeeded in getting a perpetual injunction to restrain them from at any time polluting the river, or passing the refuse water into it. I believe that was the practical effect.

9943. (*Professor Way.*) By whom was the conduit made which diverted the sewage from the cross piece down to Mr. Gurney's?—By Mr. Gurney himself. The conduit was carried along the carriage drive, it was made for the reinforcement of his mills.

9644. Have you power now under your own private arrangements to allow the effluent water to come in, or to shut it out as you think proper?—There is an agreement drawn up, (I am not sure whether it is executed, but it has been for some time in the hands of the solicitors of both parties,) giving us power to enter on the premises demised to Mr. Marriage during the time of the continuance of the lease. In fact we pay the local board a small sum annually as a sort of acknowledgment for granting us this permission, and we made the tenant, I believe, a party to this agreement. As long as Mr. Marriage and the board of health go on together we are all right. When the freeholder resumes possession, as he may do by giving notice at the first break of the lease in six or seven years; then it will be a question whether he will allow us to go on with it. In that case we shall stop the water back, and send it down the original drain.

9645. You can do that now?—Yes, I can shut it out when I like, except in cases of very great floods.

9646. You are not bound to use the new conduit unless you please?—No.

9647. But it would be a difficult thing to drain eventually as the power of the water is so great, the quantity of water put upon that ground is far greater than it ought to be. Mr. Gurney's estate has been perfectly flooded, so that our drains will not take it in any way. Now we are a little better, but we have had ponds there, and I have not been able to till my ground for the last three or four months in consequence.

9647. Do you attribute that to the great amount of

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irrigation, or the large amount of rainfall?—The water comes down tainted with the sewage water from time to time. I believe in my own mind that the outbreak of the Bourne in Croydon has had a good deal to do with the enormous quantity of water that has come down.

9648. (*Professor Way.*) The question put to you by the Chairman was not so much whether there were any traces of sewage in the water, as whether the excessive quantity of water was artificial or natural?—I think the natural water had a great deal to do with it.

9549. (*Mr. Harrison.*) Is it not the case, that during the last two or three months every good farmer takes measures to keep the water off his land, even where there was no irrigation on fields adjoining?—It depends upon the position of the land. On low-lying land you are perfectly right.

9650. For how long have you availed yourself of the water from the irrigation land along this carriage drive at Mr. Gurney's?—About a year.

9651. Have you been disappointed in your expectations as to the quality of that water since you made that cut?—Yes, from time to time.

9652. It is not so pure as you anticipated it would be before you commenced?—No, sometimes it is as pure as I could desire it to be—whether it contains any noxious elements I cannot say.

9653. (*Professor Way.*) As pure as the river water?—Yes.

9654. (*Chairman.*) How often does the water give indications of sewage?—I have observed it many times, and it may have been as bad when I have been away, and it has escaped my notice. It is perfectly easy at any time I expect to purify it by turning it on to the land if they manage it rightly, and if they have land in hand to do it, but I think occasionally the flow of the sewage water is more than the farmer requires for irrigation purposes, and then it is sent down to us neat as imported or nearly so. I do not object to irrigation if it is properly done.

9655. Mr. Gurney stated that occasionally Mr. Marriage puts a large number of cattle upon certain plots which are at the same time under irrigation, and that the trampling of this vast number of cattle disturbs the surface, and then the water comes down turbid and muddy?—That is very possible.

9656. And of course in that case it is very likely some of the sewage matter that had not gone through the land is brought down?—Yes, very likely.

9657. Are we to understand from your experience, that there are times when the water in appearance is not at all objectionable to use, and when you cannot detect it as sewage water, either by sight or smell?—I do not say that exactly, I have had some of the water taken out in a tumbler, and I have looked at it, and I have even tasted it—certainly it is not a very pleasantly tasted water, but still I think the quantity mingled in the river would not produce much effect, if the quantity was not worse than that.

9658. If at all times the works were so carried on that you never found the water in a worse condition than at the best periods, you do not think there would be so much ground for complaint?—I do not.

9659. Seeing that the water is turned down to you bright on particular occasions, may we infer that with proper care it need never be turned down otherwise than bright?—As far as the appearance of the water goes I should quite agree to that, but there are other effects produced by this water.

9660. Have you at any time during last summer, which was a very trying one, suffered from any perceptible taint in the atmosphere?—Yes, decidedly.—there has been an awful smell at times.

9661. Do you remember at what periods?—When I received your letter last night I asked my wife, because she is more at home than I with the young children, I said, "What am I to say about it?" and she said, "On Sunday nights it is wonderfully perceptible." Whether that is owing to the men not using the water on Sunday I do not know—but there is a horrible stench at times. I have smelt it myself many times.

9662. The perception of the smell is greater on Sunday nights, generally?—Yes, I think so.

9663. Have you suffered inconvenience or nuisance from that smell?—Yes.

9664. In your health?—Yes, decidedly, and I have had two of my children ill with gastric diarrhœa and fever.

9665. Do you think that that has been caused by the smell from these irrigated meadows?—I think it is perhaps as much from the water being polluted: I think the water is polluted all round the neighbourhood, the water is not so good as it was, and I have been compelled to abandon the use of two wells, and go to Mr. Gurney's house for all the water I use now; I found a perceptible improvement in my children's health when I did so. I called in Dr. Shorthouse of Carshalton for one of the children was very ill, and he said, "The beastly sewage water—"gastric fever"—he also said, "If the child plays in "the neighbourhood, the sewage water will give the "child gastric fever." This opened my eyes a little, and I did not like it. It was a marked case of gastric fever in my little boy, he had gastric diarrhœa, and I could not stop it, it was most peculiar—the child was sick and evacuated at the same time.

9666. (*Professor Way.*) Did you not know of any such cases existing where the sewage was not in action?—I cannot say—but a man in our employ who lives close to the irrigation fields has been forced to leave his cottage—one of his children nearly died. I have been forced to prevent the tenants using the well, and to bid them go further for water.

9667. (*Mr. Harrison.*) What is the depth of the wells?—10 feet, they are surface wells.

9668. (*Professor Way.*) It is important to know whether these cases of disease were caused by the water actually brought down to your neighbourhood, or by the works themselves?—That is a difficult question to answer.

9669. You do not say distinctly that the works are the cause of the annoyance?—So much so that we are troubled with unpleasant smells from the irrigated meadows.

9670. But which is it? does the smell come from the meadow or from the water that comes down to you from the irrigated meadows?—From the water.

9671. But you have diverted this water?—Yes.

9672. Has the water coming to you had any share in the injury of which you complain, or is it the works themselves?—One I should think depends upon the other; if the men did their work properly, the water would then be perfectly pure.

9673. I want to know whether your living close to these meadows is the cause of the injury, or the water you have used which has been brought down to your immediate dwellings?—We had the smells before the water was brought there decidedly. On the road leading to the church from our house across by the Green, the smell has been excessively foul and noxious at times.

9674. And yet with that knowledge you diverted the water?—Yes, decidedly. I thought that the water must be rendered pure if the irrigation were properly managed.

9675. May we not take it that it was rendered pure up to that time?—I do not think that you have a right to assume that. Our position was this, we had a very short season for water last year, and the millers were calling out, they were very urgent for us to help them. We thought that the water was reasonably pure; but if I had known what I do now, I should have doubted the propriety of doing what we have done.

9676. Do you continue to take the water?—Yes, and occasionally it is perfectly pure, I cannot detect anything in it.

9677. Have the Croydon local board a man constantly on Mr. Marriage's farm to observe that the

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sewage is properly applied?—Yes, there is a man sent, I believe—a man of the name of Pimm.

9678. Do you think it would be from inattention to his duty if the water comes down in an impure state?—I think it is fair to infer that it would be so.

9679. Have you any opinion as to whether he does properly attend to the works or not?—If he is responsible for the proper management of those irrigation meadows he does not always do his duty.

9680. (*Professor Way.*) You believe that if for three days out of the seven this water is so pure that you do not in fact notice anything in it, proper attention would keep it in an unobjectionable state—the other four days?—Yes, if there was a larger area. I cannot judge whether Mr. Marriage is not overcharged with sewage. He must have a rotation of land to put the sewage on, he must not drown mangold wurzel, he may drown his Italian rye-grass as much as he likes, but a man cannot have his whole farm under Italian rye-grass, some of it must be shut up for hay, and the land must be kept as dry as possible in those times. It is quite possible that Mr. Marriage may not have use enough for the quantity of sewage that comes down, and then he turns it into the ditches, and part comes down to me.

9681. Your objection does not apply to the principle?—No, I do not think it does. I think sewage irrigation is a great principle if properly carried out, but it must not be in the hands of a man who will play with it. It is a dangerous matter if you get the health of people interfered with.

9682. Are not the works at present carried on a great improvement upon what would have been the state of things if they had continued to do what they did when Croydon was first sewered, namely throw the sewage direct into the river?—Yes, no question of that.

9683. Have not the different proprietors down the river expressed themselves satisfied with the condition of the water?—I think so above us. I do not know what our tenants would say as to the condition of the water, whether they could use it as they used to do. I do not believe there is a man down the river that uses the water of the river now, who is not obliged to do so. I do not think it is possible to use it with safety.

9684. (*Chairman.*) If your children have suffered from gastric fever, I presume you do not imagine that any person has given them tainted river water, but you think that the fever has been caused by the water of some well sunk upon your premises?—Yes, or from the effluvium arising from the irrigation fields, and from the ditch. I have only stated to you Dr. Shorthouse's opinion.

9685. (*Mr. Harrison.*) What means would you suggest for the purpose of sending the water out in a state of purity?—More careful management.

9686. (*Chairman.*) If you had the power of lodging a complaint with some person whose duty it was to attend to the complaint, and who could compel the man at the works to do his duty, would it not be possible to utilize the sewage so as to keep it at all times pure?—Yes; I think the principle is a good one, and it is a great pity that owing to the caprice or incompetence of a man who neglects his duty, a great principle should be allowed to be upset.

9586*a*. You say you have perceived a smell occasionally?—Yes, but I cannot form any notion how to remedy that.

9687. You are aware that no form of disinfectant is used?—I suppose not, from the horrible smell we have from time to time, I think a disinfectant would not be used, because possibly it might hurt the grass.

9988. Is this smell perceptible throughout the year generally, or at special periods of the year,—in summer, for instance, has it increased when there has been a very hot day?—Yes, it has been worse then, certainly.

9689. Have you smelt the smell during this frosty weather?—I am not at home at present, but as a general rule the smell comes on of an evening, then it is very perceptible.

9690. Is it stronger than the smell of a large farm-yard?—That is a different smell, the smell is something like the smell of diluted urine, it is a nasty ammoniacal smell.

9691. Have you been in Paris and perceived the smell there?—Yes.

9692. Is the smell you have spoken of like that?—I think it is about the same sort of thing.

9693. Has any of your land been flooded?—Yes, decidedly.

9694. At what periods has it been flooded, to what extent, and under what conditions?—I have had it flooded ever since October last.

9695. Do you think it has been in consequence of the irrigation, or of the natural rainfall?—I should say that a great part of it arose from the irrigation. I observe that when the land opposite a certain field of mine is irrigated, my land becomes swampy at once.

9696. Waterlogged?—The subsoil is filled up, and our drains will not take it.

9697. Mr. Gurney stated yesterday that he understood you had had more rainfall since the rain had set in than had fallen in the same time for the last 40 years?—That is possible.

9698. And that the Bourne is now running as full and as strong or stronger than the oldest inhabitants could remember within the last 40 years?—The Bourne breaks out periodically, when those caverns at Caterham get full.

9699. I believe it never breaks out excepting when there has been a certain amount of rain within a certain period?—I believe you are right. I can perfectly remember the Bourne breaking out four or five times in my recollection.

9700. Was your land flooded then?—I was not there then.

9701. (*Mr. Harrison.*) Have you observed your land to be flooded for several years from those irrigation works?—Yes. When the irrigation works were first commenced Mr. Marriage came to me, and I said, "I cannot plough that field." He said, "If "there is any difficulty about this matter I will pay for the draining." I laid out 18*l.* in draining one field, but I never got my money. I applied to him and also to the Board of Health, but they took no notice, and I have never had the money. Now I am putting in a 10-inch pipe to take the water which comes from those irrigation fields from time to time.

9702. (*Professor Way.*) The water soaks through, I suppose?—Yes; the irrigation field is on a looseish gravelly hill and the water comes right through.

9703. (*Mr. Harrison.*) Have you observed any beneficial effects or otherwise from the water so oozing through to your land?—It fills me with water grass, and it has done me no good at all; an immense quantity of water has come through; that 10-inch drain is running full now.

9704. Although the water may contain some useful manurial properties, they are lost from your land being swamped?—If the man does his duty properly with the sewage there ought to be nothing left in it when it comes through; it has been a great annoyance to me because it has stopped my plough and prevented me getting my land ready for cropping. I do not care a rush about the loss; the point is whether the irrigation is properly carried out; if it is properly carried out I thoroughly believe it is a very good thing, but if not it is a nuisance to the neighbourhood.

9705. If it could be shown that at a moderate cost any form of chemical disinfectant could be used, I suppose you would infer that the local board ought to be compulsorily made to use it?—Yes, I think so.

9706. In order to prevent this smell?—Yes; but whether it would not destroy the fertilizing property of the water is another point. I think you would be contradicting the very principle upon which you put the sewage on the land, if you took out the ammonia and fixed the salts.

9707. Your observations seem to lead to this, that any town applying sewage to land should not let the

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power go out of their hands, but that it should exercise a control over the application of the sewage, and be responsible for its being properly applied, so that it should not become a nuisance to any person in the immediate vicinity, and that the water should be passed away as pure as it may be?—Yes, that is exactly what I mean. I do not think that the area at Beddington is large enough; and as Croydon grows the nuisance will be intensified. The man who holds that farm I think will find that he is overpowered at times with the sewage, and that there is more than he can utilize.

9708. (*Chairman.*) At the present time Mr. Marriage pays a rental for the land under sewage, and you would say that his object will be to get the most out of it that he can in the way of profit?—Certainly.

9709. Unless a spur is put upon him in some other shape to diminish the nuisance as much as possible, the purification might become with him a secondary consideration?—When this plan was first adopted he took a lease of this farm under the board, I had some conversation with him about it, for I doubted whether he would make it answer, paying, as he does, 5*l.* an acre. My own idea was that there was some agreement between Mr. Marriage and the Board of Health; that he was to be held entirely harmless and free from all chance of loss either in a reduction of rent or in a bonus. I said so, but he denied that.

9710. It is clear that there has been no necessity to carry out such an agreement if it existed?—No.

9711. Do you think that Mr. Marriage is carrying on his works at a profit?—Not just now I am afraid. He has lost 28 cows. I should say that if a man can cut such an incredible quantity of grass in weight, as he says he did last year, he must have made money, because green food was exceedingly dear, and he was sending up tons and tons weight of this grass. He used to cut, I am afraid to say how many tons in a year—16 or 20 tons to an acre. He must have made a fine thing of it as far as it went.

9712. Do you consider that the irrigation works have anything to do with the loss of his cattle?—No it is the frightful rinderpest.

9713. (*Mr. Harrison.*) On Mr. Marriage's farm there appears to be one acre for each 100 persons whose sewage is applied?—Yes.

9714. Do you think that with proper care, that would be a sufficient quantity of land?—I do believe it would, but in time it would be necessary to acquire more land. It must be borne in mind that out of those 360 acres there must always be a proportion which is not in a condition to receive sewage water. You may assume that he grows roots, but no corn, I think. Roots, Italian rye grass, and all sorts of wurzel, swedes, and common turnips. Of course there is some land all ready to receive the sewage; some under it and some in a state that cannot be subjected to this irrigation. I do not think you can assume that he can have more than one-third of that land under irrigation. In the first carrying out of a new system like this, you must look for some errors, but I think it possible that Mr. Marriage has allowed this man, who should be under his control, not properly to manage the sluices. He brings the stuff on to the land, and very likely in a fit of idleness, or from inattention, turns it down the ditch, an unpleasantness has been caused, but still we must remember that Croydon is increasing at a tremendous rate, and I do not know that 360 acres of land will suffice.

The witness withdrew.

Adjourned.

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Ayres, C., Esq. (coal merchant in Reading):
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Baker Mr. W. (of South Norwood), M.R.C.S.:
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Barker, W. G. (of Worthing), Esq., M.D.:
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Barnes, Mr. J. (of Richmond), barge carman:
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Berry, Mr. J. R. (of Isleworth), master lighterman:
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Blackwell, E., Esq. (Mayor of Reading):
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Blandy, J. J., Esq. (Town Clerk of Reading):
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Blandy, W. (of Reading), Esq., Thames Commissioner:
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Bloomfield, Mr. B. (Foreman at St. Giles' Mill, Reading):
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Bohn, H. G. (of North End House, Twickenham), Esq.:
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Brodie, Sir B. (Professor of Chemistry in the University of Oxford):
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Brown, Mr. F. (borough surveyor of Windsor):
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Bully, F. A., Esq.:
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Burrows, Mr. R. (of Twickenham):
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Burstal, Capt. E. (Secretary to the Thames Conservancy Board):
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Campbell, R. (of Buscot Park), Esq.:
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Carpenter, Dr. A. (of Croydon):
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Carr, J. R., Esq. (Alderman of the city of Oxford):
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Carter, Mr. C. (of Great Marlow), county surveyor:
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Carter, W., Esq. (Surveyor of Reading):
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Castle, Mr. J. (General Surveyor to the Thames Commissioners):
Towing-paths.—When washed away, Commissioners take from the land enough to replace them; they do not make up the banks, 1916. *Navigation.*—Maintenance of, is of great importance to Lechlade, as the chief traffic there is carried on by water down the Thames and Severn Canal, 1918–20: width of waterway at St. John's lock has diminished 20 feet, 1921–2: which is caused by deposits after floods being left there by the owner, 1923: weir keepers entitled to levy tolls for flashes and for passing boats, 1938; the right to levy included in the rental, 1939: river is silting up at the mouth of the Evenlode, 1955–6: any attempt to restore the navigation of the upper Thames would be futile, 2030: entire revision of the navigation necessary, 2058: level of river near Oxford should be reduced a foot; this would destroy several mills of little value, 2760: describes state of river from Oxford downwards, and the condition of the locks and weirs belonging to the Thames Commissioners, 2774–99. Commissioners have no power to dredge for general improvement of the river or sell ballast, 8661: but such powers should be conferred, as it would be a means of raising funds, 8662. *Locks and weirs.*—Witness describes the dilapidated condition of weirs and locks within jurisdiction of Commissioners, and various obstacles to navigation which they have neither the power nor the funds to remove, 1916–36, 1967–94: in certain places weirs tend to the formation of shoals, 1961–2: and to flood the lands, 1963: fixed overflow weirs should be placed at the pound locks, 2048–51: and also underwater weirs at mill streams to prevent millers reducing the water below a certain level, 2052. *Fisheries.*—Description of fisheries at Lechlade and other places on the upper Thames, and their rental, 1936–41, 1947. *Flashes* above Skinner's weir are practically abandoned, 1939–40; flashes at Wolvercot mill are worked through the mill instead of the weir, 1942: flashes should be continued as part of any system for repairing the Thames below Oxford, 2033. *Embankment* at Rushey lock on the Oxford side floods adjoining lands, 1995. *Floods.*—More rapid descent of, attributable partly to land drainage, 2029; floods at Reading, Henley, and Windsor much higher than formerly, 8685. *Dredging*, effect of, in certain parts of the river, 2040–4. *Management of river.*—Present Commissioners adapted for the purpose, but should be incorporated, 8680–1: they are not qualified for superintending the traffic as they have no interest in it, 8681: board should be elective, 8702–3.

Chadwick, E. (of Richmond), Esq., C.B.:
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Chamberlain, Mr. T. (of Windsor), coal merchant:
Traffic.—Formerly had coals by river, at a cost of 4*s.* 3*d.* or 4*s.* 6*d.* a ton for conveyance from the Pool at London; a barge has come in two days; three days would bring it easily, 4009–17: received the chief part of his coals from Derbyshire by railway; they are sold here at 24*s.* per ton, 4021, 4028: thinks there is not the least chance of the river traffic being restored, 4035: some of the heavier goods from the docks, such as hogsheads of sugar, might be brought by river if the Thames were put in a good state, but the bulk of the goods would still

Chamberlain, Mr. T.—*cont.*
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Chant, Mr. J. (of Richmond), relieving officer:
Describes the nature and extent of out-door relief; defective state of the cottages and the consequent prevalence of disease, 6372–86: no sewers in some of the parishes, 6388, 6395: water supply derived from Barnes and Mortlake, but it is confined to better class of houses, 6404, 6409.

Chapman, W. (of Richmond), Esq., clerk to magistrates:
States the local government of Richmond, its population and rateable value, 6020–6024, 6033–6035 (see also paper handed in by witness at p. 198.) *Sewage, Sewerage.*—Modern improvements have necessitated turning greater amount of sewage into the Thames, but that from Richmond, though passed into the stream in an undiluted state, does not affect the sanitary condition of the river; on the contrary, the greater force of the tidal wave, from the removal of obstructions, and the large quantity of water taken by the water companies, brings up to Richmond an immense body of the "slush" of London; a new reach has been proposed for the deposit of sewage, but no doubt it must be taken into the metropolitan sewer, 5999–6015, 6036–39: no profit by utilizing the sewage, 6066: system of sewerage at Richmond, 6018, 6019. *Water supply* of Richmond from the Thames, 6030. *Conservancy Board* have done nothing to cleanse the river near Richmond, 6017: there would be no objection to give the board further legal powers, 6045: but Richmond ought to have a representative, 6050. *Taxation.*—Parties concerned would acquiesce in any equitable system of, 6052.

Chillingworth, W. (of Twickenham), Esq.:
Condition of the Thames much worse as to quantity, 6441–2: agrees with Mr. Vincent Griffiths as to foulness and diminished volume of the river, and as to the difficulty of boating, and the foul state of the banks at low water, 6447–8: lock and weir near Isleworth the only efficient means of improving the river, 6450. *Taxation.*—Riparian owners would not object to be rated, 6451–3, 6462. *Conservators* should obtain legal powers if they have not got them, and levy a rate to meet the expense, 6455: should also obtain power to divert sewage from the river, 6461. *Navigation* much impeded, 6457. *Sewers* should not run into river, but Twickenham lies so low, it would be difficult to avoid it, 6459.

Clarke, Mr. C.
Kennet is in a filthy state: pollution of the Thames is a matter of national importance, as London depends upon the river for its water supply, 3274; the traffic of the river a small matter compared with the health of London, 3275: nuisance arising from Reading sewage passing into the river ought to be stopped, 3276–7: Thames is comparatively clean above Reading, 3278: bottom of the Kennet is saturated with gas tar, 3278: existence of fish no test of purity of water; fish after being put into punt wells all die in a day or two, whereas formerly they lived for weeks, 3279. *Navigation* of the Thames is a thing of the past, 3280. *Fishing.*—Very good in the Thames, 3289.

CLUTTERBUCK, Rev. J. C. (Long Wittenham, Abingdon):
Geological character of valley of Upper Thames described, 1: sources of perennial supply, oolitic strata to the north, chalk strata to the south, 1. *Drainage.*—Perennial supply would be endangered by land drainage of chalk subsoils where the water now weeps out in springs, 57–85: it is the stagnant water which, though a small quantity, does the mischief to the meadows: the meadows should be relieved by shallow drains with an outlet to a lower level of the river, 6–8, 12–17. *Mills* require stringent regulation: with regulation their interests and those of the navigation which now clash, might be harmonised, 4, 86, 87. *Weirs* require regulation also: in some cases, as at Sandford, there is insufficiency of waterway, 6; there should be some authority to compel the weir tackle to be drawn upon the coming of a flood; floods could be anticipated if rain gauges were established all along the valley, 4. *Fisheries* of insignificant value do much mischief, 34–36. *Navigation.*—Flashes are a vicious system, and would be unnecessary if the river were put in order, 36–38. *Banks* are altered inevitably by action of stream; it would be difficult to restrain owners from planting eyotts, &c., 23–33. *Water supply* of Oxford would be endangered if deep drains were cut through the gravel stratum between the river and the railway lake from which the water is now pumped, 9.

COMMISSIONERS OF THE THAMES:
Are without funds, and do nothing, *Adams*, 171, 210, 216; their existence is a hindrance, 214; *Iles*, 6801–2.
Consent of Commissioners to riparian owners availing themselves of the Land Drainage Act cannot be obtained, because Commissioners do not meet, *Adams*, 214.
Suggested changes in constitution of commission, *W. Blandy*, 3089–90, 3099; *Randall*, 573, 597–99.
Extent of jurisdiction, *Blandy*, 3137.
Since opening of railways the annual income of commissioners has fallen from 15,000*l.* to 3,000*l.*, *Darvill*, 3872.
Counsel's opinion given that the Commissioners would be personally liable for debts contracted, *Darvill*, 3872–3.
Constitution of present body cumbersome, *Darvill*, 3882; should substitute a body chosen by certain riparian proprietors, 3917–21.
Pay as much attention to the navigation as their limited means permit, *Graham*, 8566; *Vansittart*, 7649.
Act of Parliament required to deal with claims of old bondholders, *Graham*, 8581–6; *Hester*, 1446–58.
Not an efficient body, *Hayne*, 7591; *Pring*, 3257.
Might be made a constituency to elect a board, *Hedges*, 1706–7.
Are an unworkable body; no one will do the business, *Hester*, 1400–2, 1407–14: they are unfit to be even a constituency, 1415, *Stephens*, 2931–48.
Should be superseded by a body not too numerous, *Liddell*, 401–2.
There could not possibly have been devised a board less likely to discharge its duties in an efficient manner, *Nelson*, 5362: commissioners might be turned into an elective body, 5368.
Bondholders would accept a composition of 10 per cent., *Pring*, 3253: have no means of realising their capital, 3263–4.
Are in difficulties and in debt, *Randall*, 545: a change must be made, but a transfer to Conservancy would be distasteful, 600–1.
Too numerous for a working body, *Simonds*, 3330.
Neglect the river, and are quite an impracticable body, *Towle*, 1545–55, 1583–5.
Now at a dead lock: in debt, no power to borrow, and works falling into decay, *Ward*, 930–36.
Have kept the railway as far away from the Thames as they could, *Witherington*, 4290.

CONDITION OF RIVER:
In some places much worse than formerly, *Arkell*, 6818; *Chillingworth*, 6441–2, 6447–8; *Edwards*, 7153; *Fuller*, 4988–9; *Gould*, 5917–20; *Griffiths*, 6360–1; *Hansard*, 5772–3, 5887–91; *Hunt*, 6506–9; *Nelson*, 5248; *Pinniger*, 7162–3, 7167–71; *Rice*, 7098; *Taunton*, 7263; *Wheeler*, 6248–9.
Not much better or worse than it has been for many years, *Barton*, 4785–9; *Rolls*, 7428–9.

CONDITION OF RIVER—*cont.*
At Richmond has been improving since London sewage has been taken from the river, *Beard*, 6229–30.
Diminished in depth, in consequence of dredging in the Pool and lower parts, *Berry*, 6609–14.
Unwholesome condition of river will deteriorate property on the banks, *Chadwick*, 6590.
Not more impure than formerly, *Chamberlain*, 4092; *Miles*, 5977.
Near Cricklade in better state than formerly, *Gantlett*, 7086.
At Twickenham is most offensive, *Glossop*, 6689.
Decrease in the volume of the Thames causes of decrease; suggested remedies, *Griffiths*, 6338–47.
Does not run so fast as it did, *J. Johnson*, 5575.
Large black masses of weed like black froth are sometimes seen, *J. Johnson*, 5615.
Is now a gigantic sewer, *King*, 8815.
Great carelessness shown all along the river side in allowing refuse to wash into the river, *Simpson*, 5529–33.

CONSERVANCY BOARD:
Should have control of river throughout; interests of riparian proprietors and millowners might be purchased with this object, *Andrewes*, 3155–6.
Have done nothing to cleanse the river near Richmond, *Chapman*, 6017.
Should obtain legal powers to levy a rate, *Chillingworth*, 6455; and to divert sewage from river, 6461.
Should contribute towards improvement of the river, as they receive an annual sum from the water companies, *Donnithorne*, 6099, 6101.
Should be representative, *Gould*, 5937–8.
Landholders would object to be placed under Conservancy Board, *Graham*, 8598.
Have had the conservancy of river from Staines to Yantlet Creek from time immemorial, *Nelson*, 5389.
Should be conservators of the whole river Thames from Cricklade to the sea, *Nelson*. 5313.
No person can encroach upon the river without the consent of the Conservators, and they are very vigilant, *Nelson*, 5331–4.
Should have control of river, the Upper Thames district being represented by four or five members, *Vansittart*, 7692–5.
Statement of proceedings in chancery taken by the Conservancy Board to restrain the borough of Kingston from passing sewage into the Thames, *Wilkinson*, 5194–9, 5203–8.

CORNWALL, Mr. J. (of Fairford), surgeon:
Only obstructions are remains of old flams, 7368. *Drainage*, improvement of, has diminished disease, 7369: cesspools in a disgraceful position, no outfall in the whole parish worth the name, 7373: imperfect drainage entails heavy expense to parish in consequence of increased disease, 7376. *Nuisances.*—Inspectors of police would not be useful as inspectors of nuisances, 7378: each union should have an inspector of nuisances, 7379. *Water* decidedly less in summer months; causes of, 7386.

COTTON, Rev. Dr. (Provost of Worcester College, Oxford):
Worcester College meadow is liable to be flooded from water penned back at Mr. Morrell's brewery, 877, 893.

COUSINS, Mr. S. (of South Norwood):
Has rented irrigated land for 12 months, 9494: describes the weight of crops raised, the price per ton, and the number of crops per year, 9495, 9504, 9522: no smell from the open ditches, except in one part of 1865, but that arose from a cause which can in future be remedied, 9505–10: men employed do not suffer in health, nor do any of the numerous customers complain, 9521–2: passengers complained when the works began, but not since, 9514–17: expects an increase in crops this year, 9522–4: prefers clay soil to gravelly one for irrigation purposes, 9527: very little of the land is subsoiled and drained, 9531: would only drain in places where there was too much water, 9532.

CRESSWELL, Mr. A. (of South Norwood), F.R.C.S.:
States his professional experience of fevers in India, China, Australia, and the Pacific, their probable causes, &c., 9176–207: cases of fever occurred in March, April, and May 1865 in good houses at Eldon Park, South Norwood, 9209–12: will not say that these cases arose from applying sewage to land, but were so peculiar that he and others could come to no other conclusion than that malaria was the cause,

CRESSWELL, Mr. A.—*cont.*
9259: cases of fever occurred prior to establishment of irrigation works at Norwood, 9245: which may have arisen from putting in drains to draw off subsoil water of canal, 9297: experienced at Norwood smell of organic impurities floating in the air, 9263: emanations from sewage would be more dangerous than from marshes, 9264–5: where the soil is saturated with sewage poisonous exhalations are thrown off, 9274: before ascribing the cases of fever mentioned to malaria from the irrigation works, witness requires another year's experience, 9312.

CRESSWELL, Mr. W. (of Great Marlow), farmer:
Not much difference in the state of the river bed during 25 years, 7596. *Floods* do as much good as harm, 7603. *Fish.*—48 years since he saw salmon in the river, 7607: plenty of perch and jack now taken, but little trout, 7608: fish are not so plentiful as they were, 7609. *Weirs*, if abolished, water would be diminished in depth, 7614. *Sewage.*—Great part of liquid sewage drains from cesspools into the gravel, 7620: contents of cesspools generally emptied on to the land, not thrown into the river, 7622–3.

CROYDON. *See also* NORWOOD, SOUTH:
Attempts to disinfect sewage failed, *Carpenter*, 8181: methods adopted, *C. W. Johnson*, 8251–7.
Crops of irrigated land described, *Marriage*, 8491–8540.
Death-rate of, *Carpenter*, 8175–8182.
Description of sanitary works, *Latham*, 8330–57: health of men employed not affected, *Pimm*, 8490.
Mode of irrigating land, *Latham*, 8421–2.
No injury to public health from irrigation works, *Carpenter*, 8185.
Sewerage works, description of, *C. W. Johnson*, 8251.
Property at, increased in value, *C. W. Johnson*, 8278–82.
Water supply of, *Sutherland*, 8231: not sufficient, *ibid.*

CUTLER, Mr. W. H. (of Windsor):
Waterworks.—Proprietor of Windsor Waterworks, 4317: water obtained from wells situate on Tangier Island, 4322: raised partly by water power and partly by steam power, 4323: forced into mains, and overflows at highest point, 4327: pumps 440,000 gallons per day, 4328: has three wells, one 20 feet deep, another 60 feet deep, and a third 30 feet deep, the diameter ranging from 5 feet 3 inches to a little over 8 feet, 4335–6: the 60 feet well is partly a 12-inch bore-hole, 4338: chalk at the bottom of each well, 4337: supplies the barracks and nearly all Windsor, except the castle, 4341: castle waterworks are on the opposite side of the river, the water there being pumped from wells, 4332–3: charges the barracks 8½*d.* per 1,000 gallons, and the town 1*s.* upon the rack rental, with a small extra charge for water-closets, 4349–50: supply constant, but has no reservoir, 4352: no charge for fire service, but is paid 6*d.* per 1,000 gallons for supply for watering streets and flushing sewers, 4354–5; when witness took the works 10 years ago, they were in a bad state; has replaced wooden mains by cast-iron ones; diameter of largest main, 9 inches, 4359–66: could supply a great deal more water if required, 4379. *Mills.*—Has a mill worked from the same head as the wheel for the waterworks, 4383–5: head kept up by a wooden weir, 4388, which has no doubt increased the power of the mill very much, 4912: the weir, as it keeps up the head of water, is of more service than the lock, which is exclusively for the navigation, and that is really nothing, 4946. *Navigation* is very difficult: has a small pleasure steamer drawing 3 feet 5 inches which can hardly get past a place near Chertsey; it has to be kept in the channel with a pole, 4918: there are other pleasure steam boats, 4926: Egham lock in very bad state, 4921: bed of river has silted up most decidedly of late, and the weirs and locks are in a much worse state, 4929. *Traffic.*—The trade of the river would perhaps be increased if the channel were deepened, kept properly ballasted, and the sills of the locks lowered; but thinks the mill owners would benefit more than the navigation, 4954–4957: pleasure traffic is increasing, 4949.

DARTER, Mr. Alderman (of Reading):
Ballast taken from the Thames very useful for building purposes, 3295. *Sewage.*—Large quantities of, flow into the Thames, 3297: sewage should not be allowed to pass in, but the difficulty is what to do with it, 3299.

DARVILL, H. (Town Clerk of Windsor), Esq.:
River Management.—Is a commissioner and a committeeman. Corporation of Windsor has property in the Thames; has fishery rights, and owns both sides of the river, 3856–62: committee meet several times in the year, at various places, 3864: the chief business of the committee is to maintain the works, but have not funds sufficient to meet the current expenses: since the opening of the railway the annual income has gradually fallen from 15,000*l.* to 3,000*l.*, 3869–72: took counsel's opinion to the effect that if we contracted liabilities we should be personally liable, 3872–3: if great mischief accrued to the country by one of the locks giving way, we could not, under our Acts of Parliament, turn round upon any one: Acts loosely drawn, and should be repealed, 3877–9: believes the river might be made self-supporting, if the debt could be satisfactorily compounded and paid off, 3880–1: constitution of present commission cumbersome, 3882; should substitute a body chosen by certain riparian proprietors, and pay them their expenses, 3917–21. *Traffic.*—Thames at Windsor used for pleasure purposes more than for the carriage of merchandise, 3888: but the facilities for pleasure traffic are insufficient, 3889: locks were constructed too cheaply, and the expenditure for maintenance is so much the greater, 3889–90: traffic might be greatly increased if steam-tugs were placed on the river, 3907: cannot compete with the railway without a reduction of tolls, 4002–4. *Floods* would not be materially affected by an alteration in the navigation, 3892: The river might be kept within a certain channel by raising the banks, but at an enormous cost, 3893: the floods rather do good to some lands, 3894: does not think that deepening the river would appreciably lessen the floods, 3982. *Sewerage.*—Carried out a scheme of sewerage devised by Mr. Rowe, 3896: the sewage of 15,000 people in and about Windsor passes into Thames, 3898–3906. *Riverbed, Banks, and Boundaries.*—Has no doubt as to the law that the bed of the river belongs half to the proprietors of one bank and half to the proprietors of the other, though, for the purposes of the navigation, the bed of the river belongs to the commissioners, 3969: boundary line varies, sometimes it is the middle of the river, sometimes one bank, and sometimes the other, 3909: banks are constantly shifting, making it difficult to define the boundary: a clause in an Act of Parliament giving the power to define boundary would be very valuable, 3910–15: for many years persons have been in the habit of ballasting the river when, where, and how they liked; byelaws now being made to regulate this matter, 3971: commissioners have no power to require owners to repair banks, 3979. *Water companies.*—If water companies were compelled to pay for water taken from the river, it would be a very legitimate source of revenue, as, without the maintenance of locks and weirs the supply of water could not be kept up, 3929–34. *Pollution of river* on the increase, in consequence of the abolition of cesspools, 3990: drowned animals get amongst the weeds and smell most offensively, 3985: thinks it as important that the river should be free from putrefying matter as that a public highway should, 3988. *Application of sewage to land.*—To throw sewage into river is a great public waste: the sewage of Windsor and Eton ought to more than pay the expenses of separation from the water, 3994.

DASHWOOD, Capt. F. (of Kirtlington Park, Oxfordshire):
Floods, attributed to mills, might in many cases be prevented by improved drainage, 1757–1765: they sometimes carry away hay, 1776. *Embankments* ought not to be left to individuals to do, at the same time care must be taken that any general scheme be not too expensive, 1766–1779.

DAUBENY, Dr. C. G. B. (Professor of Botany in the University of Oxford):
Sewage.—Residence at Botanical Gardens seriously affected by discharge of sewage into Cherwell from a culvert; bed of river opposite outfall occasionally cleared out by town authorities, 894–899, 908, 920, 921: running water tends to purify sewage thrown into it, but not safe to trust to this process; a small quantity—and chemists can say how much—of organic matter in drinking water may make it poisonous, 906–917: vegetation tends to absorb sewage; but neither presence nor absence of vegetation proof of purity or impurity of stream, 918–920, 922–925; American weed, 900–905.

Davy, P. (of Croydon):
Works for local board of Croydon, and has occasionally emptied sewage tanks, but it has not made him sick, 9472–4.

Day, Mr. H. (of Isleworth), surgeon:
Describes the sanitary condition of Isleworth, and the diseases arising from the foul state of the Thames, 6633–42. *Sewerage.*—There is no system of, at Isleworth; sewage filters through the gravel, 6643. *Water supply* obtained from springs, 6644: agrees with the evidence of Mr. Glossop and Mr. Bohn, 6660.

Dennett, Mr. W. H. (of Worthing), clerk to local board:
Worthing has been sewered throughout, 7746. *Sewage* is applied in part to land, 7745, 7749: the remainder goes into the sea, 7753: prior to 1852 it was entirely discharged into the sea without any ill effects, 7750–1: description of company formed for utilizing sewage, 7754–61: application of sewage to land not injurious to health of neighbourhood, 7761, 7766: no smell arises, 7773.

Denton, J. B., Esq.:
Subjects as to which witness is prepared to give evidence, 8708. *Water supply.*—Each river basin should supply water to inhabitants within the basin, 8708: minimum quantity of water in a river no indication of its capability to yield sufficient supply; recourse should be had to storage; source of perennial supply, 8710–11, 8758: water should be taken from spring heads, and equivalent given to the river from reservoirs, 8714: great skill required in selecting proper sites for reservoirs, 8723. *Sewage.*—Plan adopted for disposing of, at Maidstone lunatic asylum, 8724: discharge and utilization of, in districts on the Thames, 8743–8. *Drainage.*—Best method for valleys is drains to lower levels than the rivers, 8725: plan proposed, 8727. Restrictions should be placed upon mills, 8730–2; plan proposed for future government and maintenance of the Thames, 8732–40. *Taxation.*—No land can be taxed that derives no benefit from the works, 8741. *Rainfall* of London, 8751: estimates for reservoirs must be based on minimum, 8752: classification of soils as to absorbent qualities, 8756–7: pervious soils do not require drainage, 8759: effect of draining them, 8762: clay soils, effect of drainage of, and of deep steam cultivation after drainage, 8763–72.

Donnithorne, E. H. (of Twickenham), Esq.:
Sewerage.—Drains now bring down twice the quantity of filth into the Thames, 6084: inhabitants of Twickenham would be willing to join in any combined scheme to remove sewage from the river, 6093–6095. *Water supply* of London the principal cause of diminution of water in the Thames, 6086: boating has been particularly injured, 6085, 6103. *Taxation.*—Riparian owners would not object to be rated for improvement of the river, 6100. *Conservators* should contribute towards improvement of the river, as they receive an annual sum from the water companies, 6099, 6101. *Floods.*—Works might be constructed to prevent, 6107.

Doust, Mr. W. H. (of Teddington Lock), lock-keeper:
Appointed by the Conservancy Board, 6477: traffic through the lock has increased during last 12 months, 6479, 6498–6501: with a falling tide a vessel might be left aground from one spring tide to the next, 6484: water is always running over the weir, 6487: but depth much decreased, 6489–90: water is not a nuisance, 6491: description of Teddington Lock, 6492–7.

Downing, Robert, Esq. (Engineer to Oxford Waterworks):
Water supply of Oxford.—The works belong to the city, 986: water is pumped from Railway Lake, 987: of 11 acres in extent, which fills itself with water percolating from river, 1074–1079, 1091–1096: an additional supply, if necessary, is obtained by ditch from Ferry Hinksey, and this at present is but imperfectly filtered, 994–1000: present supply is to about half of population of city, say to 18,000 persons at 61 gallons per head, but that includes water for streets and a railway, 1021–1023, 1050–1053: lake would yield more if necessary, but fresh works would have to be constructed, 1089–1094: provision in case of fire, how far sufficient, 1039–1047: pumping machinery, 988–992, 1001–1020: defects, want of a high service reservoir and a larger main, 1024–1038, 1069, 1070: at present water is pumped direct into main, 1027: charges, 1057–62: analysis of water, 1066–7, 1071–2.

Drainage:
Inside drainage may be carried out without doing away with floods, *Arkell*, 6832.
Regular system of drainage would lessen floods, *Arkell*, 6850.
Of South Norwood, *Baker*, 9421.
Meadows should be relieved by shallow drains with an outlet to a lower level of the river, *Clutterbuck*, 6–8, 12–17.
Plan for draining valleys, *Denton*, 8727.
Effect of draining pervious soils, *Denton*, 8762.
Effect of draining clay soils, *Denton*, 8763.
22,000 acres of land above Sandford subject to floods, *King*, 8816.
Land would be greatly increased in value if properly drained, *King*, 8820.
Of the Bagshot sands, *Menzies*, 4646–54, and of the London clay, 4655–61.
Surface draining quickens the discharge and diminishes perennial supply; but deep draining decreases it, because it makes soil absorbent and retards discharge, *Phillips*, 2536–40.
If the river were put into a better condition there would be a better fall for the drainage, *Pinniger*, 7165.
Above Oxford has caused floods to come down more rapidly, *Randall*, 617.
Above Reading has greatly accelerated floods, *Simonds*, 3335.
As to draining agricultural lands, *Wood*, 6997–7014.
River level should be 2 ft. below surface of meadow, *Woodley*, 3737.

Drake, Mr. (foreman carpenter on Thames Navigation):
Sandford Mill.—Built Sandford Lock, 1148–59: level of neither weir nor lock sill altered, 1165, 1166: level of lasher not altered in his recollection, 1224: posts placed in waterway of lasher and compensation lock removed, 1203–17, 1291–96: Sandford throttles water, 1276: high-water mark should be lowered 4 inches and a wider lasher made, 1382, 1386: remembers mill wheels being altered at Sandford, 1251–1256. *River-bed.*—Commissioners used to ballast, 1171, 1174–1176. *Banks* washed away; remembers a towing-path gate three times washed away, and gate was each time moved further inland; laying chalk rubble might have saved the land, but commissioners never ordered it save on their own land, 1183–1194: Flams, 1195–1200. *Towing-path* considered as private property, but people not warned off, 1180–1183. *Weirs* cause a hole below and a bank beyond, *e.g.* at Caversham, 1234–1250, 1267–1274: at Caversham removing such a bank at time when the sill was lowered 18 inches reduced the gain of water over sill to 6 inches, 1238, 1239, 1308: too narrow, 1385: a fixed weir at head of a mill-run would not answer, 1388, 1389. *Locks.*—Proper construction is solid masonry, 1297–1306. *Sewage.*—Pollution is increasing, 1277. *Gas tar* lies at bed of river at Wallingford 3 inches deep, 1280, 1281. *Paper Mills.*—Refuse from Sandford Mill kills fish, 1282–1285: Sutton Mill a nuisance also, 1286–1290.

Dredging:
Commissioners have power to dredge, but do not use it, *Adams*, 218–21.
Commissioners have no power to dredge, for any general improvement of the river, *Castle*, 8661.
What dredging is done is not for navigation, but for ballast, *Adams*, 209.
Effect of, in certain parts of the river, *Castle*, 2040–4.
Boats clear river without dredging, *Bossom*, 353–4.
Effect of, on low-water level between Teddington and Westminster, *Burstal*, 9051.
Commissioners used to employ 16 men in 4 boats to dredge, *Franklin*, 2606–7.
Oxford Paving Commissioners claim exclusive right to dredge within three miles of that city, *Galpin*, 454–64: cost of dredging, 459–61.
Effect of, on low-water level at Richmond, *Leach*, 8950–63.
Private rights of dredging, &c. should be abolished, and vested in Conservancy Board, *Leach*, 9001–2.
Should be done by steam, as being cheap and effectual, *Leach*, 9044–9.
Mischievous effects of unequal dredging, *Platt*, 6704–11.
Beneficial effects of dredging at Eisey, *Ruck*, 7074–6, 7093–5.
Steam dredging would be useful, *Simpson*, 5480.

DYSON, Mr. G. J. (of Harleyford), bailiff to Sir W. Clifton:
Floods are injurious if the water goes too fast over the land, 7699, 7719: shallows nor weeds do not tend to increase flooding, 7706, 7708, 7710.

EAST, J., Mayor of Kingston, Esq.:
Sewerage.—New works in progress which will discharge into the Thames; Conservancy Board have taken proceedings in chancery to restrain this, 5046-50. *Utilization of sewage* has been considered a great many times by the drainage committee of the town council, 5051. *Waterworks.*—Pumping stations of the London companies are above the outfall of the sewage, 5060: the pumping has certainly reduced the volume of water, 5061-3: Kingston is supplied by the Lambeth Waterworks Company; sometimes the water supplied by them is thick and discoloured, 5069-71. *Fish* are abundant, 5081: has not heard complaints of their being killed by anything passed in to Thames, 5085.

EDGAR, Mr. T. (of Worthing), surveyor to local board:
Describes area sewered, number of houses and water-closets draining into sewers, the population, &c., of Worthing, 7791-97: when first appointed sewage was carried to the sea, 7798: witness states result of experiments as to application of sewage to land, 7801-27: no nuisance from land, 7828: produce of hay per acre, 7854-5.

EDMONDS, Mr. A. (of Longworth):
Confirms evidence of other witnesses examined at Lechlade, 7388.

EDWARDS, Mr. E. (of St. John's Bridge Weir):
Agrees with the evidence of Messrs. Basson and Hart, 7153: river is in much worse condition than it used to be; if cleansed it would be of great benefit to farmers, 7153: a little expense would keep the river clear of weeds, 7159.

EMBANKMENTS—BANKS:
Shifting banks confound boundaries, *Adams*, 190–99; *Darvill*, 3910–15.
Riparian proprietors ought not to be called upon to maintain banks, *Adams*, 200.
Riparian proprietors should be called upon to maintain banks, *Dashwood*, 1779.
Benefits of embankment, *Bennett*, 7392, *Iles*, 6787–9, *Parker*, 6764, 6754–5, *Pinniger*, 7172.
Not beneficial to land, and do not prevent floods, *Millward*, 7279–80.
Exposed, and give out noxious exhalations, *Bloomfield*, 3571, 3575–6.
Precautions to be used in making embankments, *Arkell*, 6841–2.
Are altered by action of stream, *Clutterbuck*, 23–33; *Harcourt*, 132–5.
Commissioners have no power to make embankments to prevent floods, *Graham*, 8567.
Commissioners have no power to require owners to repair banks, *Darvill*, 3979.
Much washed away and undermined, *Treacher*, 4826.
Might be prevented from washing away by laying chalk rubble, *Drake*, 1190–3.
Are at present made only by voluntary concert of individuals, *Harcourt*, 138–9, 142.
Do not raise floods if put a good way back from the river, *Harcourt*, 110 1.
Embankment at Shifford, two miles long, has produced a great deal of good, *Harcourt*, 110.
Improved by levelling, *Ingram*, 4422–33.
Would give greater scour, and should be carried out on a general plan, *Wood*, 7028–32, 7038.
Should extend to the whole river, with hatches for irrigation, *Bennett*, 7395.
Give longer flood and more scour, *Berry*, 6617–19.
Doubtful benefit in a money point of view, *Campbell*, 6924–7, 6940.

ETON:
Sewerage of, *Goodford*, 4111, 4114.
Sewage of, passes into the Thames, *Barton*, 4758–63.
Water supply of, good, *Barton*, 4767; source of, 4768.
Was at one time so flooded people had to go about in boats, *Darvill*, 3891.
Not flooded so much now, *Barton*, 4775.

EXALL, Mr. W. (of Reading):
River traffic declined in consequence of railways, 2955–9: if tolls were lower and the river cleared water traffic could compete with railways, 2967–8: sills of locks require lowering, or else mills should not be allowed to draw down headwater so much,

EXALL, Mr. W.—*cont.*
2973, 2977. *Floods.*—Occasional only at Reading, 2981: lands are not injured by them if the water soon passes off, 2984: water of the Kennet is most offensive, 2991: refuse from paper mills on the Kennet kills the fish, 3003: steps to be taken to put the Thames into proper condition, 3007. *Taxation.*—Towns benefited by the navigation would not object to contribute, 3010.

FISH—FISHING—FISHERIES:
Fisheries insignificant in value, *Adams*, 164–8. *Parker*, 6739.
Fish and spawn poisoned by sewage, *Bohn*, 6571, 6573.
Fishing would be improved by constructions of locks, *Bohn*, 6568.
River will be as well stocked with fish as ever, *Burstal*, 9120.
Description of fisheries at Lechlade and other places, *Castle*, 1936–41.
Existence of fish no test of purity of water, *Clarke*, 3279.
Fisheries of insignificant value do much mischief, *Clutterbuck*, 34–6.
Saw salmon in the Thames 48 years ago, *Cresswell*, 7607.
Fish not so plentiful as they were, *Cresswell*, 7609.
Fish are abundant, *East*, 5081.
A good take of eels at Sandford might be worth 10*l.*, *Franklin*, 2661.
Fish have increased in consequence of the sewage in the river, *Gould*, 5932.
Fish are frequently found dead from the foulness of the water, *Griffiths*, 6369; *J. Johnson*, 5631.
Fisheries benefited by weeds, *Hart*, 7143.
Fishery at Lechlade not worth considering, *Iles*, 6807.
Fish not killed by sewage, *Ingram*, 4470–1.
The most valuable fish, as the Thames trout, are most affected by the sewage, *J. Johnson*, 5752–3.
Spawn destroyed by ballasting, and by swans, *J. Johnson*, 5682, 5736.
Fish spawn on the hills in shallow water from 1st of March to 1st of June, *J. Johnson*, 5731–2.
Hay crops have been destroyed for the purpose of catching a few eels, *King*, 8872.
Wherever a sewer runs into the river there are plenty of fish, *Miles*, 5991.
Powers of fish to assimilate sewage limited to undecomposed parts of fresh sewage, *Rolleston, page* 73.
Difficulties of pisciculture in a highly cultivated country, *Rolleston, page* 73.
The Thames was never more bountifully supplied with fish than now, *Rolls*, 7436.
Diminished in quantity from the refuse thrown into river, *Vansittart*, 7662.
Fishing has largely increased, *Wheeler*, 6256; not profitable as an occupation, 6278.
Kinds of fish taken at Richmond, *Wheeler*, 6273–77.
Fishery most certainly falling off through the pollution of the river, *Witherington*, 4271–2.

FLASHES:
Do not flood the land, *Bossom*, 361–2.
Above Skinner's weir are practically abandoned, *Castle*, 1939–40.
Should be continued as part of any system for repairing the Thames below Oxford, *Castle*, 2033.
Are a bad system, *Clutterbuck*, 36–8.
Cause little but not much flood, *Franklin*, 2674–6.
Purify river in its course through towns, *Hedges*, 1754–6.
Should be abolished, *Leach*, 9041–3.
Flood the land, *Napier*, 1781.
Are injurious and cause an artificial flooding, *Parker*, 6768.
Are detrimental to the navigation, *Saker*, 3203.
Dangerous and extravagant, and in any improvement of the Thames should be abolished altogether, *Simpson*, 5501–9.
Loss of water power to mills by flashes, *Stacey*, 678–83, 704–5.
Never new a flash to cause a flood, *Stacey*, 753–4.
Are injurious to millers, *Towle*, 1609.
Not now used at Great Marlow, the depth of water being sufficient for the size of the barges, *Vansittart*, 7645.
Flood the land above Oxford even in driest time of summer, *Ward*, 940.
A flash is about 4 feet of water, *Ward*, 1369.
Do great mischief, and with a good system of navigation should be done away with, *Wright*, 7511–15.

FLOODS:
- Increased by obstructions in river, *Acland*, 2152–3; *Bossom*, 369.
- Manure the land, *W. Arkell*, 6829.
- Leave behind an offensive effluvium from decaying matter, *Acland*, 2106–9; 2191–3.
- Injurious to health, *Acland*, 2171–2, 2152–63.
- Caused by irregularity at weirs, *Adams*, 307; *Saker*, 3192.
- Injurious to ploughed land, but not to grass land, *Vansittart*, 7633; would relinquish the advantage of floods if preserved from over-flooding, 7636.
- Tenants would willingly pay 6 per cent. upon outlay for embankments to prevent floods, *Adams*, 225–6.
- Land drainage reduces amount of flooding, *Andrews*, 3157; *Dashwood*, 1757–65.
- Injurious to land, *Parker*, 6717.
- Beneficial to land, *Arkell*, 6832, 6835–8; *Campbell*, 6922; *Darvill*, 3894; *Gantlett*, 7091; *Rolls*, 7450; *Treadwell*, 1893–8; *Harcourt*, 114–15.
- Come down more rapidly now than formerly, *Arkell*, 6848; *Barnes*, 6530–2; *Castle*, 2029; *Hansard*, 5774; *Hayne*, 7586–8; *Iles*, 6810; *Johnson*, 5670; *Stacy*, 664–9; *Towle*, 1532–8.
- Excessive flooding not the necessary consequence of deep draining, *T. Arkell*, 6853.
- Beneficial in the winter, if they run off soon, *W. Arkell*, 6817–6825.
- Could be anticipated if rain-gauges were established all along the valley, *Clutterbuck*, 4.
- If regulated by proper locks would purify the river, *Iles*, 6811.
- Do as much good as harm, *Cresswell*, 7603.
- Should be allowed to pass over the land, *King*, 8867.
- Would not be materially affected by improvement of navigation, *Darvill*, 3892, 3982.
- Works might be constructed to prevent floods, *Donnithorne*, 6107; *Harcourt*, 143; *Saker*, 3190–1.
- Harmless for three or four days, but not longer, *Woodley*, 3729–30.
- Injurious if the water goes too fast over the land, *Dyson*, 7699, 7719.
- Injurious if allowed to lie long on the land, *King*, 8832; *Leach*, 9070; *Spearing*, 2681–9.
- Not increased by shallows or weeds, *Dyson*, 7706, 7708, 7710.
- Improvement in value of land if water could be brought on or kept off at will, *Spearing*, 2710–14.
- Lord Abingdon's meadows are purposely left liable to floods, *Hester*, 1465–9.
- Duke of Marlborough's lands above Oxford depreciated 10*s*. an acre by floods, *Napier*, 1780–95.

FRANKLIN, Mr. THOMAS (Keeper of Sandford Lock and formerly Captain of a Thames barge):
Navigation.—Up to 14 years ago was captain of "Brimscombe" boat down to London, 2591–2593: a voyage to London and back from Brimscombe would take three weeks, from Lechlade from three to six weeks, 2656–2657: there used to be 20 big boats from Oxford to London, 12 from Lechlade, 2596–2599: obstacles to navigation between Lechlade and Oxford, 2600–2601; 2668: obstacles below Oxford, 2608, 2671–2673: Commissioners used to employ 16 men in four boats to dredge, 2606, 2607. *Sandford.*—The old pound, 2608–2612: present lock in time of flood and otherwise, 2626–2630, 2646–2650: waterway at lasher diminished; posts inserted; two sluices done away, and the level of lashes raised by planks, 2636–2643. *Flashes.*—Caused a little but not much flood, 2674–2676: used to be brought by bargemen and were not stopped by millers, 2602–2605: otherwise now at Sandford mill, 2631, 2632: High-water mark has nothing to do with navigation; made for protection of land, 2632–2635. *Fishery.*—A good take of eels at Sandford might be worth 10*l*., 2661.

FULLER, Mr. J. (of Maidenhead), miller:
Has a corn mill with two wheels of about 20-horse power, driving eight stones, 4963–6, 4998–5002. *Lock tolls* bring in about 40*l*. a year, but more than this is expended in maintaining the weir, which costs annually nearly 100*l*., 4974–5: money taken for small pleasure boats does not go to navigation, 5019: should be some plan of lifting small boats across, as they waste more water than the barges, 5020–1. *Condition of river* gets worse. The channel is filled up by silting and by weeds, and the pound locks are in a wretched state, 4988–9.

GALPIN, Mr. J. (Surveyor to Oxford Local Board of Health):
Sewage.—Oxford is partly drained into cesspools, partly sewered; outfall of three main sewers is into Isis and Cherwell, 416–421: deposits at outfalls are occasionally removed by board of health, 450–453: projects of complete sewerage of Oxford, 435–449, 476–490. *Water supply* of Oxford comes partly from Railway Lake, partly from wells by which seven-eighths of area of city is perforated, and which are still used for drinking purposes, 427, 428: no attempt is made to separate wells from cesspools sunk in same subsoil, though that subsoil is absorbent, 420, 421, 425. In Oxford the greatest essential of a cesspool is considered to be that the liquid should soak away, 425, 426. *Dredging.*—Oxford Paving Commissioners claim exclusive right to dredge within three miles of city, 454–464: not controulled by commissioners, 458: cost of dredging, 459–461: character of ballast, 468–475.

GANTLETT, Mr. J. (of Water Eaton, Cricklade), farmer:
River.—Neglected state of the river below does not allow the water to fall sufficiently to drain the land above, 7083–85: river is in better state than formerly, 7086. *Floods.*—Flooding in some cases is beneficial, 7091: agrees with Mr. Ruck generally, 7089: but differs from him as to the outfall, 7091.

GLOSSOP, Rev. G. P. G., M.A., Vicar of Twickenham:
Residents are in favour of erecting a lock to remedy the lowness of the water, 6682, 6684: river at Twickenham is most offensive, 6689.

GLOSSOP, F. H. N. (Amyand House, Twickenham), Esq:
Depth of river much diminished, and the smell from the sewage is most offensive; water companies abstract more water than they did, and the river is greatly impeded by weeds, 6602. *Weir and lock* would effect great improvement, 6602. *Taxation.*—Great objection to extend area of rating beyond the immediate banks of the river; Brentford would not object to be taxed, 6603–5.

GOODFORD, Rev. C. O., D.D. (Provost of Eton):
Is an *ex-officio* member of the Thames Commission. *Sewerage* of Eton College coeval with the building itself, 4111: about 1844 a fresh system was constructed at a cost of about 4000*l*., 4114: the sewage of about 4000 people floats into the river below the college, 4120–25: health of the college has certainly improved since it was sewered, 4142: the preservation of the river for pleasure purposes very important to the boys, 4141. *Floods.*—Inconvenienced sometimes by flooding, but not so much as in former years, 4107–8. *Water supply.*—The college has wells on the premises, and has an engine that supplies water to some of the houses, 4130–4. *Ballasting.*—The college occasionally ballasts one part of the river to keep the stream clear, 4149–53.

GOULD, Mr. F., (of Kingston), chemist:
Is chairman of the Kingston drainage committee. *Sewers* are ventilated by air shafts, 5911: number of houses drained, 5915. *River* is in worse condition than formerly, partly attributable to water abstracted by water companies, 5917–20: *Fish* have not diminished, 5922–4: fish have increased in consequence of the sewage in the river, 5932. *Sewage.*—No increase of sewage thrown into the river last summer, 5914, 5916: sewage must continue to run into the Thames as hitherto, 5925: it is the proper receptacle until something better is provided. 5939; Conservancy refused to allow Kingston people to convey the sewage further into the river, 5925: Thames from time immemorial has been receptacle for sewage, and as the natural valley must receive all the surface or sub-soil drainage, 5930–1: approves of an intercepting sewer, 5934: sewage from Surbiton is innocuous, 5961. *Taxation.*—Costs of improving river should be met by local taxation, 5935–6. *Utilization of sewage.*—Suggests adoption of plan proposed at Ely for, 5944: difficulties of obtaining land near Kingston for utilization purposes, 5946. *Conservancy Board* for managing river should bep resentative, 5937–8.

GRAHAM, T. (of Abingdon), Esq.:
Is clerk to commission of the upper districts of the Thames. *Thames Commissioners* pay as much attention to the navigation as they can with their limited means; if nothing has been done in the upper navigation it is because that part does not

Graham, T., Esq. —*cont.*
pay anything, 8566: commissioners have no power to execute embankments to prevent floods, 8567: nor to prevent sewage passing into the Thames, 8625: if the river were renovated the navigation would pay, 8571: some of the old bondholders offered to accept a composition, 8572–4: an Act of Parliament would be required to deal with, as a great number are trustees; the navigation bonds were granted in perpetuity, 8581: the investment was looked upon as safe, but the security has vanished, 8583–6: the navigation is dangerous, and the locks and weirs are ruinous, 8591–2. *Management of river.*—Thames ought to be under local management; landholders would object to be placed under the Conservancy Board, 8598: the commissioners should have power to sell ballast, 8601: if the Conservancy Board maintained the banks landowners would not object to sale of ballast, 8603: if the river were placed under the board, commissioners might elect 15 representatives for the upper Thames, who should not interfere with works in the lower part of the river, and so *vice versâ*, 8605–12: for the benefit of adjoining land the river requires to be put under some efficient superintendence, 8617. *Taxation.*—Water companies and those who use the navigation should pay for improvement, 8622. *Mills.*—Great restriction should be put on mill owners, 8629: authority having future management of upper district should take mills into their own hands and relet them, 8630. *Floods.*—Commissioners are not required to prevent floods, except those caused by their own works, 8638: millers are subject to a penalty for causing floods, 8640. *Locks.*—Every lock owner would give up his right to lock dues if the commissioners would keep the locks in repair, 8650: commissioners should have power to fix and vary their tolls, 8656.

Greenfield, Mr. G. (of Worthing):
Is manager of the irrigation works. States the method of applying sewage at Worthing, the produce from the land, its value and receipts for same, also the expenditure, 7873–7903: no complaints have been made of smell from the sewage, 7903: the works are being enlarged, 7914. *Water supply* of Worthing is obtained from the chalk, and is very good, 7919–20.

Greswell, Rev. R., of Worcester College, Oxford:
At his own expense has secured Port Meadow from summer floods; means adopted, (1) procuring an outfall to lower level; (2) cleansing bed of river; (3) raising an embankment. In winter Port Meadow is made to act as a temporary reservoir for high floods, which are let off gradually, to the great relief of Oxford, 315–337. *Floods* over Port Meadow have destroyed 20 acres; six of these irrecoverably lost, 318.

Griffiths, V. (of Twickenham), Esq., secretary to the boating club:
State of the river.—Diminution in the volume of the Thames water, 6338, 6350, 6353: the decrease has been going on for a long time, but more markedly in the last two years, 6332: causes of decrease, 6339–43: remedies for, 6344: a lock and weir would have a beneficial effect, 6345: but dredging would do as much harm as good, 6347: American weed increasing, 6348–9: the volume of water passing over Teddington weir is the same as formerly, but it comes irregularly, 6358–9: the water is fouler than it used to be, which is attributable to increase of sewage and diminished water for diluting it, 6360–1. *Sewage* of Twickenham is turned out at low water, and the odour is most offensive; it comes down with the back water, leaving a filthy deposit; the consequence is great increase of sickness in the neighbourhood, 6361–8. *Fish* are frequently found dead from the foulness of the water, 6369.

Gurney, S., Esq., M.P.:
Offensive smells arise from river and irrigation water at Beddington, *page* 315: the Wandle is rendered impure from the sewage water, and fish has become scarcer; river water is quite unfit for culinary purposes, *ibid.*; property adjacent to sewage works much deteriorated in value, *ibid.*

Hansard, T. C. (of Kingston), Esq.:
Condition of river has altered for the worse as to quantity and quality; attributes this principally to the abstraction of water by the water companies, 5772–3, 5887–91. *Floods* come down more rapidly, and they certainly run off more quickly, 5774: the immediate cause of flooding and discolouration here is the river Mole, 5776. *Utilization of sewage.*—Describes a tract of country near Kingston adapted for sewage irrigation, 5810: objections answered, 5876–9.

Harcourt, E. (of Nuneham Park, Oxfordshire), Esq.:
Floods are caused in great measure by accumulation of gravel at bottom of rivers, 116: and might partially be prevented by dredging, 143: but dredging is the duty of commissioners, not of riparian proprietors, 131–136. *Embankments* are at present made only by voluntary concert of individuals, 138, 139, 142: would not be so much required below Oxford, 151: do not raise flood if put a good way back from the river and space between embankment and river is cleared of hedges and other impediments, 140, 141: an embankment has been made two miles long at Shifford; though a very small matter it has produced a great deal of good, 110: another embankment of six miles long is about to be made between Ensham and Newbridge; in this length only one field, about 30 acres, has been shut out from the bank, because the owner thinks floods an advantage, 110, 111, 114, 115. *Banks* are slightly altered by stream; it is give and take between proprietors on opposite sides; commissioners do not interfere, 132, 133, 137. *Taxation.*—Riparian proprietors would object to be taxed even for maintenance of rivers, except possibly under a permissive Act, like new Highway Act, 147–150. *Paper Mills.*—The discharge from Sandford mill pollutes river and poisons fish, 153–157. *Sewage.*—The discharge of Oxford sewage into river below Sandford would be resisted, 159–161.

Hurley, R. C., Esq. (of St. Giles' mill, Reading):
Water power 50 horse, aided by steam engine of 16-horse power, 3512. *Pollution* by sewage, and previously by night carts emptied into river, 3522–3525, 3536–3540, 3544: water at mill rendered undrinkable, 3541: by tanyard refuse, 3517–3521. *Navigation* if restored would be convenient, but could never compete with railways, 3527–3535.

Hurris, W. (of Worthing), Esq., M.D.:
Since the sewerage was completed health of town improved, 7927–8: fevers formerly prevalent are entirely removed by the system of drainage now carried out, 7932: no nuisance caused by application of sewage to land, 7933. *Water supply* derived from an artesian well; no sewage can get into it; it is perfectly pure, 7945: the sewage irrigation works will not be injurious to health, 7951.

Hart, Mr. W. T. (of Buscot), fishery renter:
River is full of weeds, but that is a benefit to the fishery, 7143: people higher up cut the weeds and leave them in the river, which causes a great nuisance at the locks and weirs, 7147–51.

Hayne, Mr. J. (of Great Marlow), boat builder:
Navigation has gone to decay for want of funds, 7567: it has been neglected by the Commissioners, 7580: the traffic would be considerable if the Commissioners had it in their own hands, 7580: if river put into proper condition and the tolls lowered the trade would be revived, 7581–2: no nuisance arises from the brewery outfall; there may be a stench at low water, 7571, 7573. *Water* flows into the river more quickly now, but not to a greater height, 7584–5: it passes away more rapidly on account of the new bridge, so that the floods are not so great as formerly, 7586–8. *Thames Commissioners* are not an efficient body, 7591.

Hedges, J. K., Esq., (Wallingford):
River management by commissioners inefficient, 1696: ought not to be transferred to commercial body, 1705: or to conservancy without admixture of local element, 1714: perhaps commissioners might be made a constituency to elect a board, 1706, 1707: if reduction of rates made, to which old lock owners have always objected, and navigation works were restored, river might be self-supporting, 1698: Government might advance money, taking a preferential charge on tolls, 1700-1704: if necessary, a moderate tax might fairly be levied on riparian proprietors, 1712-1714. *Navigation.*—Flashes purify the river in its course through towns, 1754–1756: High-water mark is a matter of dispute, and has ceased to be a protection against flooding; Thames Navigation Acts are ambiguous and ought to be

Hedges, J. K., Esq.—*cont.*
repealed, 1715–1720*a*: Thames, how far a highway; if commissioners failed, millers might have either to remove their weirs, or, keeping them, to maintain the navigation, 1727–1740.

Hempstead, Mr. J. (of South Norwood):
Sanitary condition of Norwood was much worse than now; it had neither water supply nor drainage, 9449: never smelt anything from the irrigation works, 9454: the open ditch which existed formerly was a perfect nuisance, 9457: property all round Norwood greatly increased in value, 9459.

Hester, G. P., Esq. (town clerk of Oxford):
River management.—Is commissioner, committeeman, and clerk to 6th district; had to appoint himself as committeeman for district, because no one else would take the appointment, 1391-1394: present commissioners an unworkable body; no one will do the business, 1400–1402, 1407–1414: they are unfit to be even a constituency, 1415: they should be superseded, and their power transferred to magistrates of counties adjoining Thames with representatives from towns, who would act by sub-committees, 1415–1445: a county rate should be levied to maintain Thames, 1478: Parliament should provide for existing bond debt, 1446–1458: how far Thames a highway, 1470–1477. *Navigation.*—Locks are in a dangerous state, 1396–1399: the part between Oxford and Lechlade has been neglected, never has had locks with double gates, but it could maintain a traffic, 1480–1482. *Sandford Mill.*—Founded in time of Knights Templars; from the first a grievance to Oxford; might have been bought a few years ago for 5,000*l.*, 1460–1464. *Floods.*—Lord Abingdon's meadows are purposely left liable to floods, 1465–1469.

Hodes, Mr. G. (of Worthing), engineer to local board:
Describes the pumping establishment at Worthing, the quantity of water and sewage raised per diem, &c., 7955–8007.

Hodges, W., Esq. (auctioneer in Reading):
Scheme for carriage of Reading night-soil to waste land 10 miles off was tried and failed, 3756–9.

Hunt, Mr. H. (of Richmond), reporter:
Water of the Thames considerably lower, 6506: and its quality impure, 6509; steamboats cannot get up to Richmond, 6519. *Sewage*, proposal to utilize under Thames Purification Bill, 6510: practical farmers speak highly of the scheme, 6512.

Iles, Mr. R. A. (of Lechlade), agent to Sir. G. East:
Navigation.—Bed of the Thames is silting up, 6783. *Embankment.*— Land would be greatly benefited by, if constructed so as to let water on the land and shut it out at will, 6787–9, 6793: no necessity for, if the river were thoroughly cleansed above Lechlade, though the meadows would suffer in consequence, 6789–90. *Thames Commissioners* do nothing to the river, 6801. *Fishing* at Lechlade not worth consideration, 6807. *Floods* come down more rapidly than formerly, but not to any great extent, 6810: by not doing away with floods, and having proper locks, the water would be sent down pure, 6811.

Ingram, Mr. T. (of Windsor):
Is connected with the Royal Gardens, and has known the Thames for 20 years, 4392. *Sewage* of Windsor and the Castle flows into river by Queen's Drive, 4400: part of the sewage is thrown over the Home Park by flooding, 4397: sewage of Frogmore goes into the main sewer, but is used at the kitchen garden, 4442: when the floods get into carriage drives, has to employ men to scrape off the refuse, sometimes two inches in depth, 4449: has noticed plenty of dead animals floating down the river, 4456. *Fish* not killed by sewage; thinks they get fat upon it, 4470–71. *Towing-paths* maintained by the Crown, 4478: barges pay a toll of 9*d.*, which goes for the benefit of the farm; amount received in 1854 about 16*l.* 10*s.*, in 1864 about 7*l.* 10*s.*, 4484–5. *Utilization of sewage* attempted some years ago, but abandoned, 4486–7. *Banks* improved by levelling about 14 years ago, 4422–33.

Isleworth:
Diminution in depth of river at, *Berry*, 6609–10.
Death-rate, *Bohn*, 6652.
Lock and weir required, *Styles*, 6662–3.
Sanitary state of, *Day*, 6633–42.
No system of sewerage, *Day*, 6643.
Water supply, *Day*, 6644.

Johnson, C. W. (of Croydon), Esq., Chairman of Local Board:
Describes sewerage works of Croydon, 8251: attempts to deodorize sewage failed, 8252. *Utilization of sewage* met with great opposition, but the proprietors on the Wandle are satisfied now, 8263–70: land about Croydon greatly increased in value, partially caused by the sanitary operations, 8278–82: rate for water supply, 8284–90: local board of Croydon would be prepared to pump the sewage a height of 150 ft., 8311: pumping is the best system for towns, as it enables the sewage to be taken to cheaper land, 8313–14: towns should be compelled to keep their sewage out of the rivers, 8322: describes the works at South Norwood, 8324.

Johnson, Mr. J. (of Kingston), fisherman:
Has kept a punt over 20 years, 5572–3. *Condition of river.*—Does not run so fast as it did, 5575: the water is not so good as it used to be, 5582: there is a great deal of mud on the banks of the river; it smells bad in the height of summer, 5602–3: sometimes sees large black masses of weed like black froth, 5615: refuse from gasworks is put into barges; is often spilt in carrying it away, 5638–41: a great deal of discharge comes in at times from the tannery into the river, 5645: sometimes the bays of Teddington lock are nearly dry; not half an inch deep, 5656–60: the Board of Conservancy ballasts the reach between Hampton Court and Teddington, 5678; thinks weeds grow more than they did because the stream is slower, 5715. *Floods.*—The up-country flood comes down sooner than it used to do, and is sooner gone, 5670. *Fish.*—More fish come to the mouth of the sewer than to other parts of the water, 5588: there is more fishing than there was 20 years ago, but thinks this would not account for the diminution of the fish; do not know what else it can be besides the sewage, 5623–7: has picked up several dead fish that would have weighed 5 lbs. to 7 lbs. each, 5631: ballasting cuts up the spawning ground, 5682: has caught from 8 to 14 dozen fish in a day with one rod, 5686; number of punts at different places, 5690–2: punts pay no rental to the Conservators, 5694: punt costs from 8*l.* to 15*l.*, and earns 8*s.* a day, 5702–5: fish spawn on the hills in shallow water from 1st of March to 1st of June, 5731–2: the most valuable fish, as the Thames trout, are most affected by the sewage, 5752–3. *Swans* eat spawn, if they can get at it, 5736.

Jones, J. (Mayor of Windsor), Esq.:
Traffic.—Uses the river occasionally to bring up coals in barges of about 63 tons. These come from London to Windsor in two or three days, except when detained in consequence of the lowness of the water, 3815–20: if navigation were improved, and barges could get up with more regularity, there would be an increase of traffic, 3831–2: no steam barges come to Windsor, but many pleasure boats come from London, 3833–6: coals are brought by railway at 6*d.* per ton less than they would cost for conveyance by river, but would prefer to have them by river. It is worth 1*s.* a ton more to bring coals by river, on account of the absence of breakages, 3844–7. *River management.* — Is a Thames Commissioner, but has attended but one meeting, six years ago, 3822–4: should not object to the future management being undertaken by the Conservancy Board, 3852. *Sewerage.*—Eton is sewered, 3826: several cesspools still in use in Windsor, but in the better class of houses water-closets are general, 3827–30: the refuse of the castle and barracks and town of Windsor passes into the Thames at Swan's bridge or Albert bridge, without any form of disinfection being used, 3839–40. *Water supply* of Windsor is very good. Is obtained from the Thames at Eton, and supplied by a private individual, 3842–3. *Mills.*—Two near Windsor, using water-power, Clewer mill and Tangier mill, 3837.

King, Mr. F. (of Cornhill, London), land surveyor:
Has been acquainted with Thames between Sandford and Lechlade for 40 years, 8810: it was then in good navigable condition, but is now a gigantic sewer, 8813–15: land would be greatly increased in value if properly drained, 8820. *Weirs and locks* placed below junction of tributaries destroy outfall, 8825: remedies proposed, 8828: depreciation in value of land near Oxford, caused by lowering sill of lock, 8845. *Floods.*—22,000 acres are subject to

KING, Mr. F.—*cont.*
floods, 8816: not injurious unless water stagnant, 8832: places where floods are mischievous, 8851: should be control over the water, so as to allow it to pass over the land, 8867. *Taxation.*—Area of, should be that liable to floods, 8835: injury caused by erection of tumbling bay at City mills near Oxford, 8858: river grown up with mud, 8861: hay crops have been destroyed for the purpose of catching a few eels, 8872: control of river should be vested in independent board, 8876. *Sewage*, utilization of, 8877.

KINGSTON:
Decline of traffic on the Thames at, *East*, 5038–9.
Sewage of, discharged into river, *East*, 5046, 5050.
Principally drained by cesspools, *Wilkinson*, 5128.
Rateable value, *Wilkinson*, 5169.
Corporation proposed connecting outfall with metropolitan high-level sewer, *Wilkinson*, 5173–6.
Effect of sewage from, in polluting river, *Nelson*, 5253.
Should be represented at Conservancy Board, *Gould*, 5937.
Condition of river, *Nelson*, 5406; *Hansard*, 5772–3; *Johnson*, 5575.
Fish abundant, *East*, 5081; *Gould*, 5932.
Sewerage of, *East*, 5046–50.
Water supply of, *East*, 5069.

KNOX, Col. B. W. (of Marlow):
Was a member of House of Commons Committee on the state of the Thames; agrees generally with their report, 7680–1: if the Upper Thames were represented, no objection to transfer government of the Thames to the Conservancy Board, 7684: representatives should be elected, and present commissioners or county magistrates might form a constituency for election, 7693–4. *Navigation.*—If put into efficient state, with uniform tolls, traffic would be improved, 7686. *Taxation.*—Difficulty as to area of rating; river should be maintained as a common highway; a very small rate would be sufficient, 7688–9.

LATHAM, B., Esq. (Engineer to the Local Board of Croydon):
Describes the works under his control in connexion with the sanitary arrangements of Croydon; the volume of water supply, &c., 8329–57: with a perfect system of waterworks, 12 gallons of water per head may be sufficient, 8358: sewage is more beneficial in a dilute than in a rough state, 8361: a wet subsoil is preferable for sewage purposes, 8365: sewage used for irrigation not injurious to health, 8369: sewers of Croydon require ventilation, and the board are about to expend 23,000*l.* with that object, 8372–3: principle of irrigation should be never to allow the ground to get dry, 8393: temperature of sewage, 8401–10: solid matter should be separated from sewage for irrigation purposes, 8416–17: meadows at Croydon irrigated by open carriers and at South Norwood by gravitation, 8421–2: irrigation by hose and jet is a fallacy, 8424: no sickness among the men employed on the land, 8441: there is no nuisance in carrying on irrigation works, 8443: Croydon at one time spent 3,000*l.* a year in attempts to deodorize the sewage, 8448: soil at Norwood is on the London clay, 8451: the land there is drained to some extent, 8452–4: describes the principle on which it is laid out, &c., 8457–63: comparison of system at Norwood and that at Beddington, 8468–82: description of state of South Norwood prior to irrigation works, 9475: if inhabitants of Norwood prove them to be injurious local board will remove them, 9476: the owner of land on which the works are erected is owner also of other land in the neighbourhood, 9478: several complaints have been made, but each has been traced to a local cause, 9481: if there be any ground for complaint as to the works the cause would be remedied, 9483.

LEACH, S. W., Esq. (Engineer to Thames Conservancy Board):
Weirs and locks.—Formation of weirs and ponds on the Upper Thames and its tributaries, and prevention of pollution by sewage, would benefit the water companies, and for those improvements an annual rentcharge should be levied upon the companies, 8926–9: objections to weir at Isleworth, 8966–86: weir at Brentford should be relatively higher than that at Teddington, 8972: locks are too shallow, 9053: advantage of tumbling bays, 9054–6: construction of weir at Teddington, 9081–2. *Management.*—Uniform control desirable, 8943: a large board of management would not act efficiently; local interests should be represented, 8944–8: local interests would not interfere with proper management of river, 9034–5.—*Dredging*, effect of, on low-water level at Richmond, 8950–63: private rights of dredging and ballasting should be abolished and vested in the Conservators, 9001–2: dredging should be done by steam; it is cheaper and more effectual than by hand, 9046–9. *Sewage*, interception and utilization of, would be an improvement, 8968: metropolitan sewage forms a bank of mud at northern outfall, 9085: Conservators cannot prevent sewage flowing into the Thames, 9102: they ought to have that power, 9103, 9108: effect of discharging Surbiton sewage into the river, 9104–7. *Navigation.*—Thames is navigable from London to Putney only, and from Teddington upwards, 8991–3: water companies should be required to send in weekly a return of daily quantity abstracted, 9000: describes Conservancy improvement at Sunbury Reach, 9012–17: improvement above Staines would necessitate lowering sills of locks, except of that at Sandford, 9021: if navigation above Oxford were put into efficient state, it would be an improvement to the land with respect to floods, and an advantage to millers by avoiding flashes, 9060–3. *Weeds.*—Deepening reaches would diminsh growth of weeds and improve condition of river, 9031–3. *Mills* should not be abolished, but placed under regulation, 9039: millers should not be allowed to draw water below a certain mark, 9058. *Flashes* should be abolished, 9041–3. *Embankments* on lower Thames, 9064–8: riparian owners should be compelled to repair banks of their land, 9096. *Floods* are injurious if the water is allowed to lie long on the land, 9070.

LECHLADE:
Drainage of, 7324.
Fisheries, *Castle*, 1936; *Iles*, 6807: not very valuble, *Parker*, 6739.
Population of, *Castle*, 1919.
State of river at, *Iles*, 6783; *Milward*, 7266.
Sewage flows into river, *Basson*, 7123; *Milward*, 7283.
Sewerage, no system of, *Milward*, 7284.
Water supply, *Powell*, 7332–3.
Water in river diminishing, *Powell*, 7341.

LIDDELL, Very Rev. H. G. (Dean of Christ Church):
Was one of a committee, which, in 1857, under Mr. Pusey, for chairman, investigated condition of valley of Upper Thames, 393: that committee ceased to work on finding that under 3 & 4 Will. 4. c. 22. s. 61., the Sewers Commissioners Act was not applicable to any river like the Thames in the hands of a navigation commission, 394–6: in 1860 was one of a body of memorialists to Home Secretary on same subject, 388, 396: is of opinion that present commissioners should be superseded, 401: by a body not too numerous, 402: the University of Oxford should be represented, 411–13: and mill-owners should not have much power, 403: himself would very much desire Government superintendence, 410. *Mills.*—Mr. Crossley, engineer, was of opinion that putting the river into order did not involve destruction of mills, 393.

LINLEY, Mr. W. (of Ham Common):
Complains of a stream near Ham Common which from frequent cleaning has been so altered in level as to be stagnant; has not complained to the Conservators, 6470–5.

LLOYD, RICHARD, Esq. (of Sheffield Paper Mill, near Reading):
Water-power.—90-horse power if there is a good head, aided by 45-horse steam power, 3367. *Paper mills.*—Materials, 3-4ths waste paper, 1-4th Esparto grass, 3372–3374: 30 per cent. lost in process, and 18 tons of paper manufactured in a week; five tons are thus lost from material and go weekly into river in suspension; the refuse from paper being fibre and any china clay, farina, ink, or carbon contained in paper, that from Esparto grass being fibre, silica, resin, and colouring matter, the latter looks worse, but is not worse, 3376, 3451–6, 3465: chemicals,

LLOYD, RICHARD, Esq.—*cont.*
3½ tons of soda ash are used per week, one ton of bleach; the solid residue of lime, both that boiled with soda to make it caustic, and that used for bleach is kept out of river, 3378, 3444–7: all liquid used is cast into river; it is injurious neither to fish nor to vegetation, 3379–81, 3383; complaints have been made, but are uncalled for; no paper mill refuse injurious except chemicals, 3425, 3464: filtration of alkaline liquid not impossible; in future it will be done at Sheffield Mill in settling tanks erected on the six or seven acres of land attached to mill, 3382, 3384, 3457, 3464: volume requiring filtration not very large, the first liquid from boilers alone containing much refuse, not subsequent washings, 3431–3443: evaporation of alkaline liquid impracticable from price of coal, 3467–73, 3482–89: if made compulsory paper manufacturers must migrate to neighbourhood of collieries, 3478–81: nor will it answer to paper manufacturers to purchase a ready-made pulp, 3474–76: effects of abolition of paper duty, 3490–3492, 3495. *Pollution.*—Not much nuisance from floating carcases, 3409–10. *Sewage irrigation.*—Witness utilizes sewage of his own house with success in his own garden, 3414–24. *Navigation.*—Even at present rates water carriage would save to Sheffield Mill 250*l.* per annum, but it is too uncertain to be available, 3385–3401: shortness of water and increase of weeds, 3408.

LOCKS—LOCKOWNERS:
Dilapidation of locks, *Adams*, 170; *Barton*, 4771; *W. Blandy*, 3103–4; *Bossom*, 363; *Castle*, 1916–36; *Graham*, 8591–2; *Hester*, 1396–9; *Treacher*, 4802–3.
A lock at Strand-on-the-Green would interfere with navigation at Kew Bridge; a point above the Grand Junction Canal a good place, *Berry*, 6629.
Lockowners' interests should be bought up, *W. Blandy*, 3106.
Duties of old lock owners, *W. Blandy*, 3124–6.
A lock at Isleworth would improve river at Brentford, *Bohn*, 6601; *Styles*, 6662–3.
Objections to exclusion of tidal water near Richmond, *Burstal*, 9062–72.
A lock at Brentford would leave the river dry at Putney, *Burstal*, 9118–19.
Egham lock in a very bad state, *Cutler*, 4921.
Description of Teddington lock, *Doust*, 6492–7.
Description of Sandford lock, *Drake*, 1148–66; *Franklin*, 2608–43.
Proper construction is solid masonry, *Drake*, 1297–1300.
Sills of locks require lowering, *Exall*, 2973.
Residents at Twickenham are in favour of erecting a lock there, *Glossop*, 6682–4; *T. Glossop*, 6602.
The whole of the locks are too shallow, *Leach*, 9053.
Duke of Northumberland's grounds a good site for proposed lock at Isleworth, *Macandrew*, 6680.
Would like to see all the locks done away with, *Parker*, 6732.
Should be placed in the hands of mill occupiers, as they could keep them in order at comparatively little cost, and they are greatly interested in keeping water at its proper height, *Saker*, 3249–50.
Locks all require regulating and reconstructing, *Simpson*, 5482.
Lock at Godstow much out of repair, *Stacey*, 697.
Several of old locks belong to the commissioners, who bought them to relieve the navigation of the old lock tolls, *Treacher*, 4848.
Locks at Pangbourne are in very bad condition, *Wheeler*, 6264–5.
Repairs of Sonning lock since 1852 have cost between 600*l.* and 700*l.*, *Witherington*, 4261.
Should be some plan of lifting over locks the small boats, as they waste more water than the barges, *Fuller*, 5020–1.

LONDON:
Rainfall of, 8751.
Sewage of, should have been carried further seaward, 9086.
Water supply of, cause of diminution of water in the Thames, 6086.

LONGLEY, Mr. J. (of Worthing), bailiff to Irrigation Company:
States method of applying sewage to land at Worthing and condition of the crops grown, &c., 8018–52, 8061–8116: no complaints as to application of sewage to land, 8053.

MACANDREW, R. (of Isleworth House, Isleworth), Esq.:
Considerable diminution in level of river at low water, caused by pumping of water companies, 6676, 6678: Duke of Northumberland's grounds a good site for proposed lock, 6680.

MANAGEMENT OF RIVER:
Central body required; all measures to prevent floods or keep out sewage must be general to the whole river, *Acland*, 2151–67, 2169–70.
Should be vested in a body elected by landowners, *Arkell*, 6842, 6846–7.
A transfer to Conservancy not objectionable, *Blackwell*, 2838; *Jones*, 3852; *Knox*, 7684.
Should not be transferred to Conservancy, *Blandy*, 2812.
Present commissioners adapted for the purpose, but should be incorporated, *Castle*, 8680–1.
By present commissioners not efficient, *Hedges*, 1696.
No management could be worse than that of the commissioners, *Pring*, 3257.
Ought not to be transferred to a commercial body, *Hedges*, 1705, or to the Conservancy Board without admixture of local element, 1714.
Local interests should be represented, *Leach*, 8944–8; they would not interfere with proper management of river, 9034–5
Proposed scheme for vesting management in a new body of commissioners, *Neate*, 493 *et seq.*, 2073–99.
Should be in the hands of those pecuniarily interested, *Pring*, 3259.
Entire control of navigation should be placed in Thames Conservancy, *Pring*, 3253, 3265–6.
Objection to separating management from landowners and others interested, *Simpson*, 5462.
One board enough for whole of upper river, *Ward*, 1361–2.
Government ought to make a grant to maintenance of Thames as to a national object, *Ward*, 1370–81.
Present system cannot go on; all that has been done for years has been patchwork, *Witherington*, 4284.

MARLOW, GREAT:
Drainage, 7437–8, 7520–1:
Nuisances at, arise from overcrowding, &c., 7546.
River, state of, not much altered, 7596.
Sewerage, no system of, 7524.
Water supply, no system of, 7444; is obtained from wells, 7525.

MARRIAGE, Mr. J. (of Beddington):
Describes the crops raised on his land irrigated by sewage, the weight per acre, and number of crops; land partly under grass, partly arable; the grass grown is fit for feeding oxen; rotation of crops recommended, &c., 8491–8540: workmen on his land are healthy, 8543: towns should be compelled to utilize their sewage, 8548: land required for sewage of town of 1,000 inhabitants, 8554: hose and jet system of application would not answer, 8558.

MAYBURY, A. K. (of Richmond), Esq., M.D.:
Corroborates evidence of Mr. Chant as to the deplorable condition of cottage property in Richmond Union, 6413: the poorer class of dwellings being overcrowded, typhus is very prevalent, 6414–20: the medical officers should be invested with legal powers to remedy this, 6424: fever is caused by deficient drainage and bad water supply, 6428. *Drainage* of Petersham and Kew very bad, 6427: the branch drainage of Richmond is very faulty, 6433. *Sewerage* of Petersham and Kew very bad, 6427: disease engendered by bad sewerage affects the health of the better part of the town, 6435. *Sewage.*—River is much fouled by discharge of, into it; agrees with Mr. Griffiths' evidence, 6434.

MENZIES, Mr. W., deputy surveyor of Windsor Park and Forest:
Sewerage.—Great Windsor sewer takes all the sewage of borough of Windsor and of many buildings belonging to the Crown in the Home Park, besides the land drainage and surface water of a very large area of Crown property; capacity, 7 ft. 6 in. × 5ft. 3 in., 4514–29: sewer under exclusive charge of a servant of the Crown, 4530: entire volume of sewage passes direct into the Thames; no means are adopted for taking out the sediment, 4535–6: had to examine specially in 1864 the state of river near outlet; it was impossible for any place to have been in a filthier state, 4539: sewers ventilated to a certain extent, but not as they ought to be, 4691–2: considerations in re-devising any scheme for

Menzies, Mr. W.—*cont.*
the drainage of Windsor, 4696-7. *Utilization of sewage.*—Has published a book on the subject, and carried out works of application at Lincoln Asylum, Wellington College, Feltham Reformatory, at Sandhurst, &c., in several buildings on the Crown property, and especially at Broadmoor Asylum, 4543-4: the nuisance at Windsor might certainly be cured, 4545: would separate the surface water, and deal with the net sewage by putting it on the land for agricultural purposes, 4546–8: has not the slightest doubt that there is a prospect of sewage being used in that way so as to abate nuisance, and yet return a moderate profit, 4549-51: at Broadmoor the irrigation is carried on within 200 yards of the asylum, without the least nuisance or risk, 4554: fresh sewage is comparatively innocuous; it is only after the first two or three days that it becomes putrid and a source of danger, 4555-6; would use the effluent water for irrigation, putting it upon land which would at once absorb it; would mix the solid with coal ashes, 4557-9; would crop the land with Italian rye grass for two years, and at the end of the second year break the land up and take a crop of vegetables, 4561: at Broadmoor got five very good crops of Italian rye grass in one summer; in winter the land is laid into three plots, one for vegetables, one for year-old grass, and the third for two-year grass, 4566–8: after the sewage has passed through the land the water comes off perfectly transparent and pure, 4569–70: the rye grass is cut for milch cows; if made into hay is not equal to first-rate meadow hay, 4574-7: the land at Broadmoor was worth little or nothing; should say that it is now three times as productive as other land about there, 4581-5: has no doubt the same results might be obtained at Windsor, 4586: does not approve the system in use at Rugby and elsewhere of an underground distribution by cast-iron pipes and the application by hose and jet; it is expensive, and the showering down of sewage on the tops of plants sets people against the idea of the utilization of sewage, 4591-3: has seen the Worthing sewage works; should not think 1*s.* a rod an extravagant price for the grass there, 4597-9: the sooner the passing of sewage into the river is prohibited the better, 4602: has hardly ever seen a place where such prohibition would create difficulties that could not be easily overcome, 4605-19: works at Broadmoor further described, 4622–7, 4637–41, 4687–8: the main sewerage of Windsor has cost 4,000*l.* or 5,000*l.*: to adapt 100 acres of favourable land for irrigation would cost about 10*l.* per acre, 4633–5: has the management of 15,000 acres for the Office of Woods, 3,000 of which had been drained under his direction, 4642-4: geological formation of this land, 4645: drainage of the Bagshot sands, 4646-54: drainage of the London clay, 4655-61: character of the water in the sands as regards drinking purposes, 4662-3: management of surface water, 4664-7: separation of solid and liquid sewage, 4668-77: irrigation of land in winter, 4678-86: proportion of water to manurial matter, 4687–90: supposed case of impossibility of separating the rainfall from the sewage, 4698-718.

Mercer, Mr. W. (of Kingston):
Sewage of Kingston should be conveyed into metropolitan system at Wandsworth, and Kingston should contribute to the expense, 5994–5.

Miles, Mr. C. (of Hampton Wick), member of Hampton Wick Local Board:
Drainage.—Hampton Wick is chiefly drained by cesspools, and the sewage runs into the Thames, 5969–72: local board would agree to any scheme for removing the sewage, 5979. *Water supply* from wells and from Grand Junction Waterworks, 5973–6. *River* in not much worse condition than formerly, but there is a deposit which in the summer time is very offensive, 5977: tributaries act as purifiers to the main stream, 5990: wherever a sewer runs into the Thames there is plenty of fish, 5991.

Mills—Millers:
Sandford mill the great block of the river, *Randall*, 610–14.
Sandford mill a notorious block, *Adams*, 230: might have been bought a few years ago for 5,000*l.*, *Hester*, 1460–4.
Millers raise their weirs, and are not interfered with, *Adams*, 231–2.

Mills—Millers—*cont.*
Interests of millers and navigation incompatible, *Adams*, 234–7, 314.
Require stringent regulation, *Clutterbuck*, 4.
Great restriction should be put on millowners, *Graham*, 8629: authority having future management of upper districts should take mills and relet them, 8630.
Millers subject to a penalty for causing floods, *Graham*, 8640.
Mills should not be abolished, but placed under regulation, *Leach*, 9039.
Processes of pulping, &c., at paper mills described, *Lloyd*, 3372–3476.
Mills should be bought up, and relet on conditions made with regard to navigation and riparian proprietors, *Neate*, 495, 525–7.
Ensham paper mills described, *Routledge*, 2201 *et seq.*
University paper mill at Wolvercot described, *Stacy*, 639 *et seq.*
Mills just below Oxford described, *Towle*, 1504 *et seq.*
Millers consider the mills older than the navigation, and might not agree to any arrangement for putting a weir at the head of a mill-race to maintain the water at a certain level, *Witherington*, 4276.

Milward, G. (of Lechlade), Esq., Thames Commissioner:
River at Lechlade in very bad state, 7266: flams washed up on one side, 7267: the farmers at Lechlade have had the river cleared of weeds, 7282: under proper management river might be improved, 7294. *Thames Commissioners* take no measures to prevent formation of flams, 7268, but some proprietors lower down do, by planting osiers, 7270: control of river should be vested in a public body, 7282. *Embankments* not beneficial to the land, they do not prevent floods, 7279–80. *Sewage* flows into the river, but no complaint is made of the state of the water, 7283: there is no other outlet, 7293: *Sewerage,* no system of; a sewer has been constructed, but very few houses have the drains connected with it, 7284: drainage generally by means of dead wells, 7286: the sub-soil being gravel, the water percolates and large portion of manurial properties is so lost, 7287–9. *Towing-path* runs through his land, there is no public right of way; the commissioners pay witness a rate for it, 7295–6.

Moule, Rev. H. (of Fordington, Dorset):
Describes a new kind of closet upon the "dry-earth system" adapted for use in dwellings, 8879–86: means of drying the earth for deodorizing urine and fœces, 8887–91: quantity of earth required for London, 8889, 8908–9: manurial value of the earth not destroyed by drying, 8892: plan is being carried out at Lancaster and Dorset, and is used in India, 8898–9, 8912: testimony of Dr. De Renzy, medical officer at Mooltan, 8899: cost of apparatus, 8903: advantage of the system as applied to hospitals and sick rooms, 8923.

Napier, J., Esq., agent to Duke of Marlborough:
Floods.—The Duke's lands above Oxford liable to be flooded, 1780–1: consequences are loss of hay, unwholesome grazing land, poor crops, and general depreciation of 10*s.* an acre to lands, 1787–95: cause silting up of river bed, but nothing is done to clear it either by Commissioners or by the Duke, 1796–1809. *Embankment* is impracticable for want of an outfall, except at a distance and after passing through lands belonging to different proprietors, 1782–6. *Flashes* occasionally flood land, 1781.

Nash, Mr. J. (of Inglesham), farmer:
Embankments not beneficial unless properly attended to, 7355: not much difference in the quantity of water, 7361–2.

Navigation (present state):
Of the Thames a thing of the past, *Clarke*, 3280.
Is very difficult, *Cutler*, 4918; *Barnes*, 6526–8.
None now above Newbridge, none between Oxford and Ensham, *Adams*, 169.
Channel is silting up, *Adams*, 169.
No scavenging of river takes place, *Adams*, 274–5.
River at Kew Bridge can be crossed on foot in summer time, *Barnes*, 6535.
River diminished in depth, in consequence of dredging in the Pool and lower parts, *Berry*, 6609, 6611–14.
Thames navigable from the Pool to Putney at all times of tide, *Burstal*, 9113–16.
Obstacles to navigation between Lechlade and Oxford, *Franklin*, 2600–1, 2668; and obstacles below Oxford, 2608, 2671–3.

NAVIGATION (present state)—*cont.*
- Level of low water at London Bridge much lower, *Berry*, 6615.
- Thames navigable from London to Putney only, and from Teddington upwards, *Leach*, 8991–3.
- Obstruction to navigation by railway bridge built upon piles, *Saker*, 4310–16.
- From Lechlade to Oxford now at an end, *Ward*, 939.
- Boats drawing only 3 or 4 inches have great difficulty in getting up to Richmond at low water, *Wheeler*, 6251–5.
- Condition of river at Sonning for purposes of navigation gets worse, principally in consequence of the silting up below Reading, *Witherington*, 4177–8.

NAVIGATION (proposed improvements):
- Scavenging required, *Acland*, 2194–2200; *Spearing*, 2753–8.
- Commissioners' power over navigation west of Ensham should be abolished, *Adams*, 214.
- Should be a drainage commission under special Act, giving greater facilities than Land Drainage Act; no Government help would be necessary, *Adams*, 246–58, 261–6, 310–13.
- Thames should be divided into three districts, *Adams*, 243–5.
- Steam barges, *Andrews*, 3138–46.
- Thames should be cleared out, and proper authorities should decide where weirs should be erected, the expense of which should fall on the owners of the land benefited, *Arkell*, 6834.
- A lock and weir near Isleworth would improve the condition of the river, *Chillingworth*, 6450.
- Deepening reaches would diminish growth of weeds, *Leach*, 9031–3.
- Conservancy Board might require riparian owners to scavenge the river and keep the weeds down, just as in towns each householder has to remove snow from the front of his door, *Nelson*, 5307–8.
- Should be maintained from Oxford downwards, certainly not from Oxford upwards, *Randall*, 552–6.
- Most desirable to construct impounding reservoirs on a proper scale beyond Reading and Oxford, *Simpson*, 5441.
- Upper part of river must be attended to, as source of water supply to lower part, *Ward*, 939.
- Low-water mark ought to be raised considerably, *Ward*, 1358.
- Parallel embankments should be formed, weirs widened, the high-water mark lowered, and the river cleansed of weeds, *Williams*, 7049–50.
- Desirable to keep open the navigation, but it is doubtful if it would be profitable; it would be a convenience, *Wood*, 7020–1.
- Chief means of improving navigation would be removing shoals and lowering sills of locks, *Wright*, 7508–9.

NEATE, Rev. A., Rector of Alvescote:
- Geological character of Alvescote, 7315–6. *Embankment.*—None on north side, one on the south, which prevents flooding, 7302–6. *Drainage.*—Where carried out has proved beneficial, 7309: and has increased value of land, 7312: and has produced a perennial supply, 7313–4: water in the river has been getting less for many years, as also in the tributaries from the north-west, 7310. *State of river.*—The river does not appear polluted, it seems in its natural state, 7317; but the channel has diminished, and flams and weeds have grown up, 7318–9: improvement should extend to whole of river, 7321. *Taxation.*—Riparian owners should contribute rateably, 7320.

NEATE, C., Esq., M.P. for the city of Oxford:
- *Management of River.*—Would wish to see jurisdiction of Conservancy end at Teddington, where tidal water ends, and the whole of the fresh water river from Teddington upwards placed in the hands of a new body of Commissioners, 495: the body to consist of 30 or 40, 493: representatives of counties adjoining the Thames elected at quarter sessions, and representatives of towns on Thames elected by municipal authorities, 514–24: to be unpaid, but to act by paid officials, 502–3, 516–17: in order to restore navigation, Government to advance money upon security of a preferential charge on the profits of navigation, 496–7; in order to maintain it, a rate to be levied on counties and boroughs adjoining river, 528–9*a*: there is reason to believe that traffic might be restored to the river, 498. *Mills.*—To be bought up and relet on conditions made with regard to navigation and riparian proprietors, 495, 525–7. *Old lockowners.*—In the event of Commissioners being unable to maintain existing navigation works, the liability to maintain them might revert upon old lockowners; at present they only keep up weirs generally for their own mills, 505–512.

[Further examination]:
- Witness desires to substitute a more precise exposition of his views, 2073. *Management of the Thames.*—New board of management should have power to deal with conflicting interests and should have a general superintending power. The revenue from tolls has proved insufficient for maintenance of the river from unfitness of present board. To develope pecuniary resources of the Thames an element subordinate to a general body having control of mills and drainage, and having power to enforce law excluding sewage from the river, must be introduced whose interests would dictate an economical and efficient management: capital for putting navigation into proper state should be advanced by the Exchequer Loan Commissioners, towns and counties interested being taxed for payment of the interest. The income from tolls and fisheries would eventually pay off the capital. When the sewage is excluded from the river the water companies might fairly be called upon for an increased contribution, 2075: new board should have power to buy up mill and fishery rights, lock owners interests, and the bonds, 2077: new board should be elective, the county magistrates electing the county representatives, the town councils those for towns, the university having a member, 2097–9.

NEEDHAM, Mr. W. (of Phœnix Ironworks, Vauxhall):
- Describes a patented invention for the detention of substances held in suspension, and for clarifying fluids; its adoption would prevent the pollution of streams by the refuse from paper mills, potteries, breweries, and most probably that from bleachworks, dyeworks, &c., 8777–8807.

NEIGHBOUR, Mr. J. (of Great Marlow), inspector of nuisances:
- Principal nuisances in Marlow arise from overcrowding, bad ventilation, and overflowing cesspools, 7456: great deal of pollution runs into the river from the brewery drain, 7552.

NELSON, T. J. (solicitor to corporation of London), Esq.:
- Resides on the banks of the Thames at Hampton Wick, and has a special acquaintance with the river, 5244–7. *Management of the river.*—Is acquainted with the Board of Conservators, and thinks it most desirable that they should be conservators of the whole river Thames from Cricklade to the sea; the river should be under one management, and (above all things) the body should not be too numerous, 5312–13: the principle that taxation and representation should go together not always recognized in this country, and a rigid application of it would not secure a good governing body for the Thames, 5314: a large body cannot ever be an administrative body; the attention of a large body of persons to details cannot be secured, 5317–19: it has never occurred to witness that Government ought to be charged with the expense of maintaining the Thames, 5321: bonded debt upon the lower portion of the Thames provided for by the Conservancy Act of 1857, 5322-27: mode of transfer of the river from the corporation of London to the Conservancy Board, 5328: Conservators represent only the interests concerned in the trading navigation of the river below bridge, 5329: no person can encroach upon the river without the consent of the Conservators, and they are very vigilant, 5331–4: composition of the present Thames Commission; thinks that there could not possibly have been devised a board less likely to discharge its duties in an efficient manner, 5362: commissioners might be turned into an elective body, to elect 10 or 15 commissioners for the upper district, 5368: Conservators should have the most plenary powers as to dealing with locks and weirs, 5372; a small toll might very fairly be imposed upon pleasure boats passing through the lock at Teddington to be applied to the improvement of the river, 5373-4: in future the river will be kept up principally for pleasure purposes, 5377: works on the upper Thames that for want of funds have come to a standstill might be proceeded with, if the upper part of the

Nelson, T. J., Esq.—*cont.*
river were passed into the hands of the Conservancy Board under the same conditions as the lower part; but as a security for this, representatives of the upper Thames should be placed on the board, 5380–1: the improvements between Staines and Teddington, except what has been done at Surbiton, have been carried out by the corporation of London, who have had the conservancy of the river from Staines to Yantlet Creek from time immemorial, 5386–9, 5404–5. *Condition of river* altered very much for the worse, 5248: nuisance at Hampton Wick caused by the sewage lodging in a bay of the river, 5267: has seen islands below Richmond bridge continually growing out of the water, 5296: has never seen the weeds so luxuriant as they were in the summer of 1865; attributes this to the extra manuring they received from the sewage of Kingston, 5299: thinks the Conservancy Board might require the riparian owners to scavenge the river and keep the weeds down, just as in towns each householder has to remove snow from the front of his own door, 5307–8: as to casting refuse into a river, no right to commit a nuisance can exist in this country; it is contrary to common law, according to which a nuisance is indictable, 5342–4: filthy state of the river near the outfall of the Kingston sewage, 5406. *Waterworks.*—Has never seen the river so low as in 1865; attributes this to the water companies almost entirely absorbing what fresh water comes down, 5249–50: nothing upon the face of the Act of Parliament imposing upon companies any rental for water taken from the river, 5385. *Sewage* of Surbiton and Kingston passes directly into the Thames or into Hog's Mill river, which falls into the Thames at Kingston; filthy consequences of this, 5252–6: thinks that the whole drainage area included by any scheme of intercepting sewage might be fairly asked to contribute to the expense, 5286–7. *Utilization of sewage.*—Ham Common fields might be made available in any scheme undertaken by the three parishes of Ham, Kingston, and Hampton Wick, 5271–5, 5309–11. *Floods* in this neighbourhood caused principally by the river Mole, 5297. *River bed.*—From Staines downwards the bed of the river is by grant of the Crown and Act of Parliament vested in the Conservators, 5337: has an impression that ownership of bed of all navigable rivers, except where special grants have been made, is in the Crown, 5341: difficulties as to boundary line caused by the shifting of the bed of the river could be got over by a special commission being appointed to set out the boundaries as between the riparian proprietors and the Conservators, leaving it to the Conservators to take care of the future course of the river and to settle everything as to boundaries, 5398–400. *Traffic* on the river above Staines costs too much for haulage for successful competition with the railway; below Hampton water carriage may be made remunerative, 5377–8: steamers wash the banks away very much, 5379: the restoration of traffic must be done gradually, 5384.

Norwood, South:
Crops, description of, on sewage-irrigated land, *Cousins*, 9495–9504.
Diseases at, and their causes, *Cresswell*, 9209–97.
Irrigation works described, *C. W. Johnson*, 8324.
Property at, increased in value, *Carpenter*, 9459.
Public health of, *Carpenter*, 9328–99; much improved, 9460.

Oxford:
Navigation between Oxford and Lechlade, 1480–82; below Oxford should be maintained, 552, 1098; should be transferred to a company, 1121.
Sewage of, 267–289, 894, 2139–40: flows into Isis and Cherwell, 433: complete sewerage of, projected, 623–7.
Water supply of, 9, 292, 2141, 427, 428: works for, belong to city, 986: source of supply, 987, 994: analysis of water, 1066.
Port meadow used as temporary reservoir for high floods.

Palmer, Mr. Alderman (of Reading):
Consumes 1,500 tons of coals annually, which are brought by railway, 3013, 3015: would prefer using the navigation if it were in proper condition, even though the cost might be a little higher than by rail, 3014: water of Kennet full of gas refuse, 3024: sewage from his works goes into Kennet, 3025.

Parker, Mr. H. (of Lechlade), farmer:
Floods are injurious to adjoining lands, 6717: floods rise now more quickly than formerly, from the inequality of the bottom of the river, 6730–1. *Embankments* have been formed, but in an improper manner, 6720–21: if properly done would be a great improvement, 6730: beneficial effect of embankment, 6746, 6754–5: cost per mile and dimensions, 6748–53; proprietors would gladly accept Government assistance, 6771–4. *Navigation*, not worth while to restore, 6766. *Locks and weirs* are in very bad condition; should all be abolished, 6732–5. *Fishing* carried on is not very valuable, 6739. *Flashes* are injurious, 6767–8.

Philbrick, Mr. C. (tanner in Reading):
Tannery.—Materials, 100 hides and 100 calf skins a week, 3658: 20 bushels of lime, 3671: oak bark (tanning principle), 3660. *Process.*—(1) Skins steeped in milk of lime, *i.e.*, lime and water and oak bark, so as to loosen hair, 3692: (2) skins taken out, hair removed, 3695. *Waste products.*—Milk of lime serves three successive sets of skins, 3700: then allowed to subside in pits, 3669: the subsiding matter consists partly of lime, partly hair, but of no other animal matter, and is sold for manure, 3672–3: the tanning principle has been all absorbed by the hides, 3689: the liquid (700 gallons weekly) is then discharged into river, 3677, 3701: yellow in colour, and with peculiar smell, but not offensive, 3704: the hair when removed is washed in baskets in river, 3696–8, and requires 200 gallons of water weekly, 3663: this liquid has a milky appearance, 3704: the hair itself is saved and sold to plasterers, 3661: scrapings of hides go to London for size, 3674: horns, hoofs, and offal, all utilized, 3666. *Pollution* from gas tar, 3681: from sewage of 500 men at ironworks, 3682.

Phillips, Mr. C. T., clerk to Windsor Board of Health:
Sewerage.—The contract made in 1850 was for 3805*l.*, 4731: the board received a communication from Mr. Menzies with reference to the sewers in the town, and a deputation went to see his system at work at Broadmoor, 4733: about 30 cesspools still remain at Old Windsor, principally at Spittal, which lies beyond the system of drainage, 4737–8. *Utilization of sewage.*—Mr. Menzie's views have been put before the board; question in suspense at present, 4742–3: Mr. Rogers's plan for deodorization of sewage by use of peat charcoal, brought before the board in 1852 or 1853,—4744–6. *Water supply* has been recently reported upon by a committee, who recommend a continuous supply, and a charge to small tenements of 2*d.* a week: the proprietor submits that a continuous supply is not necessary, 4747–9.

Phillips, Professor (of the University of Oxford):
Water supply.—Springs feeding the Thames, 2505: geological character of Thames Valley below Oxford, 2506–8: Evenlode the most turbid tributary, 2510–11: Thames itself very bright, being fed by filtered water from springs; summer flow is essentially spring water, 2531–4: cause of lime in the water, 2508–9, 2513–16: summer flow in Port Meadow, 50,000,000 gallons per diem, 2535: theory of springs, 2517–23: not a great quantity passes into the sea, 2524: how far water takes its character from subsoil, 2525–30: artesian wells impracticable in Oxford district, 2542–55. *Land Drainage.*—Surface draining quickens the discharge and diminishes perennial supply; but deep draining increases it, because it makes soil absorbent, and retards discharge, 2536–40: effects of land drainage not to be feared with regard to Thames, 2570: storage of water possible by construction of subterranean tanks, or by the making of artificial springs, 2564–9: an increased supply obtainable by tapping natural sub-reservoirs of water in limestone, chalk, and oolite formations, such as exist in Thames Valley, 2555–63, 2571–84.

Pimm, Mr. C. W. (of Croydon):
Inspected houses in Beddington district; did not find any cases of illness there, nor ever heard of any; there is not a set of healthier men than those on the works there, 8487–90.

Pinniger, Mr. J. (of Lechlade), farmer:
Bad condition of the Thames pens up the Colne, stops the drainage, and floods the land, 7162–3: river is much neglected, and is worse than formerly, 7167–71. *Drainage.*—If the river were put into better

Pinniger, Mr. J.—*cont.*
condition, drainage would be improved, 7165: this should be done by the occupiers and the commissioners, 7165–6: waterclosets run into cesspools, not into sewers, 7176. *Embankments* would be beneficial, 7172. *Navigation,* if improved, would be advantageous, 7167. *Locks* are in bad condition, 7167. *Water supply* obtained from wells, 7178–80.

Platt, Mr. J. T. (of Twickenham), ferryman:
Water much diminished, 6704, 6710: weeds kept water up, but they are all destroyed by dredging, 6708: no diminution in velocity of stream, 6711.

Pollution of the Thames and its Tributaries:
By discharge of sewage of Eton, 4763. Hampton Wick, 5969–72. Kingston, 5252–6. Lechlade, 7123, 7283. Oxford, 622, 2139–40, 2173, 267–89, 1483–92, 2453–4, 2461. Reading, 2867, 2876–7, 3306, 3310–11, 4252–7, 4268–70, 3583–6, 3604–5, 3276–7, 3522–5, 2875, 2881. Richmond, 6173. Surbiton, 9104–7, 5252–6, 5834–5. Twickenham, 6361–8. Windsor, 3898–906, 4400, 3839–40.
By refuse from slaughter-houses, *Beard*, 6194.
By abolition of cesspools, *Darvill*, 3990.
By refuse from tanyards, *Bloomfield*, 3547–55, 3560–62; *Rogers*, 2866–8; *Simonds*, 3306–8.
By night-carts, *Bloomfield*, 3556–7; *Hurley*, 3525.
By new sewers, *Bloomfield*, 3558–9.
By refuse from paper mills, *Bossom*, 373–5; *Exall*, 3003; *Harcourt*, 153–57; *Randall*, 608–9; *Rogers*, 2879–80; *Saker*, 3225–30; *Simonds*, 3317–22; *Wright*, 7466.
By floating carcases, *Bulley*, 3770–1; *Darvill*, 3985.
By surface washings of market garden land, *Chadwick*, 6312, 6712.
By refuse from gasworks, *J. Johnson*, 5638–41; *Philbrick*, 3681; *Rogers*, 2878; *Simonds*, 3309; *Taylor*, 3077–8.
By refuse from breweries, *Neighbour*, 7552; *Rolls*, 7445–7.
Is a matter of national importance, as London depends upon the Thames for its water supply, *Clarke*, 3274.
Commissioners have no power to prevent sewage passing into the Thames, *Graham*, 8625.
Plan for preventing pollution of rivers by the adoption of a new kind of closet, constructed upon the "dry earth" system, *Moule*, 8879–8924.
Plan for preventing pollution of rivers by the adoption in paper-mills, &c. of a machine for the detention of substances held in suspension, and the clarifying of fluids, *Needham*, 8777–8808.
Process of tanning at Reading tannery described; the liquid, 700 gallons weekly, is discharged into river, *Philbrick*, 3657–716.
Public Health Act insufficient to prevent pollution of river falling short of nuisance, *Rogers*, 2879–80.
Filthy state of Kennet below Blake's bridge, *Walford*, 3804.
Solid refuse is prevented going to London by Teddington lock, *Walpole*, 5843.

Powell, A. (of Lechlade), Esq., physician:
Drainage is almost entirely by cesspools, which are emptied periodically, and the contents thrown on the land without any injurious effect on the water, 7324: some wells have been spoilt by percolation from the cesspits, 7344: a quantity of liquid excrement goes into the river, 7346. *Fever* has not prevailed much of late years; in one part of the town (which lies high) they have had fever repeatedly, which is owing to defective drainage; this has since been rectified, 7327–9. *Water supply* from wells fed by springs running through the gravel, 7332–3: water not affected by sewage in cesspits, 7334. *Nuisances*, inhabitants very ready to remove them, 7338: police are a useful body for removing nuisances, 7339. *Water* in the river diminished; the floods are not so high as formerly, 7341–2: perennial supply decreasing; cause of decrease, 7343.

Pring, Mr. T.:
Is a Thames Commissioner and bondholder, 3253. *Bondholders* of 84,000*l.* offered to accept a composition of 10 per cent., 3253: they have no power to interfere in the expenditure of the funds, 3256: and have no means of realizing their capital, 3263–4. *Management.*—Entire control of navigation should be placed under Thames Conservancy Board; sufficient money could then be raised upon the joint tolls of the upper and lower navigation to put the works in order, buy up the present bondholders, and deal with mill owners; but *ex-officio* commissioners are opposed to this, 3253, 3265–6: no management could be worse than that of the Commissioners, 3257: it should be in the hands of those pecunarily interested 3259: riparian owners ought not to object to be taxed, 3261. *Navigation*, if restored, would be remunerative, 3290.

Randall, T., Esq. (alderman of city of Oxford):
Navigation.—Traffic left the river chiefly in consequence of railways, latterly also on account of defective navigation, 551: navigation should be maintained from Oxford downwards, 552: certainly not from Oxford upwards, 554–6: Commissioners are in difficulties, in debt, have no funds, and individual members are personally responsible for cost of works ordered at meetings where they have been present, 545, 585–91: only 10 out of 600 or 700 members attend a general meeting, 536: usually few besides those who have attended the committee meeting just previous, 582–3: but occasionally, when appointments have to be given away, the few men of business are liable to be swamped by numbers, 568–78: a change must be made, but transfer to Conservancy would be distasteful, 600–601: existing body of Commissioners might elect a good working board, and delegate to them full power, 569, 573, 597–99: the board should have control over all the interest of the river, mills, weirs, fisheries, &c., 595–6: the debt should be paid off; it might be bought up for 8,000*l.* or 10,000*l.*,—567, 854. *River bed*, obstructions form, 561–563: in some places rock crops out, 617. *Mills.*—Sandford mill now twice as great as formerly, when a corn mill, 606–7: the great block of the river, 610–614: there is insufficiency of waterway at the weir, 602–5: high-water mark has been tampered with, and in Mr. Treacher's opinion might be lowered five or six inches at Sandford; not lower than that, else there would be no water on sill of Iffley lock, 617. *Drainage* above Oxford has caused floods to come down more rapidly after rain, and has affected summer supply, 617–16. *Sewage* of Oxford is a nuisance to both Cherwell and Isis, 622: complete sewerage of town projected, 623–7. *Paper mills.*—Effect upon river of refuse from Sandford mill described, 608–9.

Reading:
Fishing at, good, 3282.
Floods at, 8658.
Population of, 2821.
Navigation at, almost stopped, 2857: inhabitants of, would object to rating for restoration of, 2842.
Occasionally flooded, 2981.
Pollution of river, 2866–78, 3306.
No refuse from gasworks flows into river, 3061.
Sewerage of, by cesspools, 2815; no system of sewers, 2825.
Sewage goes into river, 2867.
Water supply of, 2898–2926.

Reynolds, Mr. C. (of Carshalton):
Is agent to S. Gurney, Esq., M.P., 9625: has resided in the locality of the outfall of the Croydon irrigation works at Beddington both before and since their erection, 9626: after the works were opened the Wandle was much fouled by deposits of sewage, 9633: but the fish were not affected, 9634: Croydon sewage was discharged in an open culvert from the irrigated land, which caused great nuisance, and formed an enormous bank of fœtid mud at the point of discharge; Mr. Bidder obtained a perpetual injunction restraining local board from polluting the river in future, 9641–2: water from irrigated land is sometimes as pure as can be wished, but at others is tainted with sewage, 9652, 9654: very offensive smells at times, especially on Sundays, 9661: which arise from the water of the irrigated fields, 9670: water is polluted all round the neighbourhood, and has caused gastric fever, 9665: sewage irrigation is an important principle if properly carried out, 9681, 9686: if not, it is a nuisance to the neighbourhood, 9704: irrigation works as at present conducted are a great improvement upon the previous system; and the proprietors on the river are now satisfied with the condition of the water, 9683: his land is flooded partly in consequence of the irrigation, 9695, 9701: no benefit derived from the flooding; it was a great annoyance, 9704: Mr. Marriage pays a rent for his land under sewage; he is not

Reynolds, Mr. C.—*cont.*
carrying on his works at a profit, 9708–11: the proportion of the land of Mr. Marriage's farm is 1 acre to 100 persons whose sewage is applied; this quantity is not sufficient, 9713–4.

Rice, Rev. R. (rector of Eaton Hastings):
River is much fouler than formerly, 7098: floods are caused by the weeds in the river rising through the subsoil; and to improve this the bed of the river must be lowered, 7101–2: river should be placed under efficient management, 7106: a commissioner, but has never been summoned to attend, 7107–11.

Richmond:
Area, population, &c., *Chapman, page* 198.
Should be represented at Conservancy Board, *Chapman*, 6050.
Boating difficult at, *Chillingworth*, 6447.
Cottage property at, condition of, *Maybury*, 6413.
Health and mortality, *Warwick*, 6127–51.
River very shallow, *Beard*, 6228; *Barnes*, 6527.
Sewage of, passes into Thames, *Beard*, 6194: does not affect state of river, 6229; river is affected, *Chillingworth*, 6434.
Sewerage good, *Beard*, 6208; *Warwick*, 6125–6, 6141, 6143.
Steamboats cannot get up to, *Hunt*, 6519.
Water supply, *Chant*, 6404, *Warwick*, 6117–20, 6177–79.

Rogers, T., Esq. (clerk to Local Board of Reading):
In Reading cesspool system prevails, 2845–54: some ancient sewers exist; no new drains for sewage are permitted to be made into them, 2845, 2867, 2873–74: previous schemes for sewage of Reading, 2855, 2859: chief difficulty is in finding an outfall, and uncertainty whether the river may be used as an outfall, 2884–87: death-rate in Reading 20 to 21, 2896. *Pollution.*—By tanyards, 2866–68: by gasworks, until within the last few years, 2878: by paperworks; a recent complaint turned out to be unfounded, 2879–80: by sewage; a branch of Thames is polluted by sewage from railway, 2875: Holy Brook is choked with sewage, and has to be cleaned out to prevent nuisance, 2881: Kennet itself greatly polluted, 2867, 2876–7, and is by poorer classes used as drinking water; fever was bad by banks of Kennet, 2888, 2892: Public Health Act insufficient to prevent pollution of river falling short of actual nuisance; polluting a river partly used for drinking purposes is not necessarily a nuisance, and recourse where possible must be had to the Waterworks Companies Act, 2879–80, 2890, 2893–4. Expense of ballasting would be met by sale of material taken out, 3294.

Rolleston, Dr. (Linacre Professor of Anatomy and Physiology in University of Oxford):
Sewage.—Solid parts to be constantly seen in the Isis; how they might be mechanically broken up; vegetable life may be utilized to purify sewage water. *Water supply* from wells in Oxford contaminated by cesspools. *Fish,* their powers to assimilate sewage limited to the undecomposed parts of fresh sewage; difficulties of pisciculture in a highly cultivated country, *pages* 73–4.

Rolls, T. (of Great Marlow), Esq.:
Was a Thames Commissioner, but seldom attended their meetings, 7401. *River traffic.*—Some years ago there was great traffic up the Thames past Marlow, which increased as navigation was improved, 7403–4: but now there is very little, 7407: railways the chief cause of diminution in traffic on the Thames at Marlow, 7408: dilapidated state of locks may have had some effect, 7409, 7422: improving the river and ballasting would not revive the traffic, 7414. *Condition of river.*—Shoals have increased, 7417: water is not in offensive condition, 7424: witness is supplied by a well, into which Thames water percolates, 7425–7: the river is said to be loaded with impurities, it is not the fact, 7428: weeds have increased greatly, 7430: a short sewer runs into the Thames, but it does not affect the water, 7436: refuse from a brewery is carried into the Thames, 7447. *Mills* above Great Marlow not now used, 7432. *Drainage* of Marlow principally by cesspools dug in the gravel, 7437–8. *Water supply,* no system of, 7444. *Floods.*—Low lands are subject to them, 7449: but are not injured, 7450: do not rise so rapidly as formerly, nor to so great a height, 7451–2.

Routledge, T., Esq. (of Ensham Paper Mills and Ford Works near Sunderland):
Water-power at Ensham; in consequence of extensive drainage floods come more rapidly and are succeeded by long periods of drought, 2206–17: instead of 4 wheels in use 8 years ago, only 2 are now used, and these but little; 2 other archways have never been used at all, 2218–20: at Ensham mill there is 10-horse water-power in driest time, and 40-horse power in wettest, besides this there is a steam engine of 50-horse power, 2221–5. *Paper Mill* manufactures 6 tons of paper per week at Ensham all from Esparto grass, 2226–37: uses from 100 to 150 gallons of water per minute all through the 24 hours, 2262–5: and in a year, lime 40 tons; bleach (chloride of lime) 130 tons; soda 140 tons, 2245, 2268, 2275: lime and soda are boiled together, and the pure ley poured on Esparto grass; the alkaline liquid goes into mill-tail, 2249–51, 2271–4: a solution is made of bleach, and residue is carted on land; sulphuric acid is used with bleach, 2267, 2269–70: bleach is precious, and is economized, 2279–82: wash water from engine is let into the river, 2258: nothing worthy of name of refuse goes into river from paper mill; waste lime is only solid matter, and that is in a state of carbonate, 2275: alkaline liquid is dark and coffee-coloured, but consists only of resin soap with gluten and colouring matter, 2246–7, 2275–6, 2289–92, 2354–5, 2363–71, 2390–94: no complaints have been made of Ensham mill, but there there are no immediate neighbours, 2310, 2371–4: otherwise at Sandford 2375, and in Scottish rivers, 2306–8, 2377–9, 2301–4: there is no precipitant for alkaline liquid except acid, a remedy worse than disease, 2334: evaporation is too expensive 2286–8, 2381–7: filtration impracticable for want of room and expense, 2335–6: application to land useless because liquid contains no fertilizing element, 2343: if Parliament were to enforce filtration or evaporation, I should shut up my mill and 3-5ths of owners of old small mills would do likewise, 2288, 2354, 2395: Esparto grass, when discovered; requires more soda and more bleach, 2239–43, 2305–7, 2311, 2424–31, 2435–8: may be prepared and material sent out to other manufacturers to work up, but this not likely to become general; it is done at Sunderland where there are special advantages, a tidal river, cheap coal, and grass brought in ships to the door, 2294–304, 2399–402, 2404–20, 2428–31: Japan paper, 2325–31: wood pulp paper, 5312–17: enlarged application of paper, 2323–4, 2332: abolition of paper duty has ruined small paper manufaturers, 2318–22, 2333, 2422–3.

Ruck, Mr. (of Eisey), farmer:
Describes measures adopted, but without effect, to compel cleansing of the river, 7066: a general conservancy board advantageous, 7072: widening and deepening the channel would be beneficial, 7076: lost 400 sheep in two seasons by rot before he widened and deepened the river; since then, the land being dry, none have died from that cause, 7092–3.

Saker, Mr. W. E. (of Shiplake Mills):
Tolls taken at the lock are received by owner, who repairs the lock and also the weir at the mill, 3175–9. *Navigation* might be revived; greatest injury is the irregularity of water, 3188, 3207. *Floods.*—Means should be provided for locking of the water at time of floods; river between Sonning and Henley badly off in this respect, 3190–1: floods attributable to insufficient waterway at weirs, 3192: effect of, on witness's property, 3194–5; much land near Sonning liable to, owing to want of openings at Henley, 3196–7, 3200: benefit of doubtful, 3252. *Flashes* are detrimental to the navigation, 3203: only small quantity of refuse from the paper mill passes into the river, and that he would have no objection to keep out, 3225, 3230: some paper makers would not like to be compelled to do so from the difficulty in getting rid of the refuse, 3238–9. *Pounds and locks* should be placed in the hands of mill occupiers, as they could keep them in order at less cost, and are greatly interested in keeping water at its proper height, 3249–50. River fuller of mud than it was some years since; supposes the additional volume of sewage has caused this, 4307–8: flood waters cause considerable annoyance at his mill in consequence of there being so little outlet from the head to the tail of the mill below, 4309: the railway

SAKER, Mr. W. E.—*cont.*
bridge at Shiplake, a wooden one upon piles, is a considerable obstruction to navigation: a pile, by throwing the water into eddies, is more hindrance than its cubical contents represent, 4310–15.

SEWAGE UTILIZATION:
Land for application of sewage should be selected with reference to prevailing winds affecting adjoining town, *Acland*, 2181–9.
Attempts made at Croydon to disinfect sewage were unsuccessful, *Carpenter*, 8181.
Has great faith in Mr. Menzie's scheme in operation at Broadmoor, *Chamberlain*, 4099–100.
Plan adopted for disposing of sewage at Maidstone Lunatic Asylum, *Denton*, 8724.
Has been considered a great many times by the drainage committee at Kingston, *East*, 5051.
Results of experiments for utilization of Worthing sewage, *Edgar*, 7801–27.
Suggested adoption of plan proposed at Ely for utilization, *Gould*, 5944.
Scheme for carriage of Reading night-soil to waste land 10 miles off tried and failed, *Hodges*, 3756–9.
Scheme for utilizing the sewage of Richmond and other towns, *Hunt*, 6510: practical farmers speak highly of it, 6512.
Sewage of Frogmore House used at the kitchen garden, *Ingram*, 4442.
Attempted at Windsor, but abandoned, *Ingram*, 4486–7.
Failure of attempt to deodorize sewage of Croydon, *Johnson*, 8252, *Latham*, 8448: scheme for utilizing sewage met with great opposition, but the proprietors on the Wandle are satisfied now, 8263–70.
Pumping of sewage is the best system for towns, as enabling the sewage to be taken to cheaper lands, *Johnson*, 8313–14.
Sewage more likely to improve land like the Essex marshes than meadows already good, *King*, 8877.
Proposed method of dealing with sewage, *Menzies*, 4545–51.
Ham Common fields might be made available in any scheme undertaken by the three parishes of Ham, Kingston, and Hampton Wick, *Nelson*, 5271–5, 5309–11.
At Windsor, question in suspense at present, *Phillips*, 4742–3.
How solid parts of sewage might be mechanically broken up, *Rolleston, page* 73.
Vegetable life may be utilized to purify sewage water, *Rolleston, page* 73.
Scheme before Parliament in 1866 for utilizing sewage of towns up to and including Oxford, *Shields*, 9543–624.
Proposal to utilize sewage of Richmond, *Smith*, 6073.
Proposed scheme, *Watts*, 3084.
Sewage of Wallingford Union now applied to a garden, *Spearing*, 2700–6.
Sewage of Surbiton, considerations involved in any scheme of utilization, *Walpole*, 5858–62.
Towns ought to be required to apply sewage to land, and have compulsory powers to buy land, *Ward*, 1330–38.
Various schemes for utilizing sewage of Kingston described, *Wilkinson*, 5173–93.
Chemical properties of sewage, and processes of separation, *Wilkinson*, 5209–20.
Proposals for a land reclamation and sewage company, *Wilkinson*, 5221–3.

SEWAGE—IRRIGATION WORKS:
No offensive smell experienced from works at South Norwood, *Adland*, 9488–9; *Hempstead*, 9454.
Value of irrigation by flooding is due to the subsidence of the fine soil, *Arkell*, 6835–8.
No injury has arisen to the neighbourhood from the irrigated fields at Croydon, *Carpenter*, 8185: no complaints from residents near the works, 8191.
Method and cost of applying sewage at Worthing, produce from land, &c., *Greenfield*, 7873–7903; *Longden*, 8018–52, 8061–8116: no complaints made of smell, 7905; *Harris*, 7933: works are being enlarged, 7914; pumping establishment described, *Hodes*, 7955–8005.
Tract of country near Kingston adapted for sewage irrigation described, *Hansard*, 5810.
Works at South Norwood described, *Johnson*, 8324; *Latham*, 8457–63.
Principles of irrigation explained, *Latham*, 8393–424.
Comparison of system at Norwood and that at Beddington, *Latham*, 8468–82.

SEWAGE—IRRIGATION WORKS—*cont.*
Each complaint of nuisance at Norwood has been traced to a local cause, *Latham*, 9481.
Description of crops raised on land at Beddington irrigated by sewage, *Marriage*, 8491–8540: workmen on this land are healthy, 8543.
Hose and jet system of application does not answer, *Marriage*, 8558; *Menzies*, 4591–3.
Works at Broadmoor, *Menzies*, 4554, 4566–85, 4622–7, 4637–41, 4687–8.
To adapt 100 acres of favourable land for irrigation would cost about 10*l.* per acre, *Menzies*, 4633–5.
Water from irrigated land is sometimes as pure as can be wished, *Reynolds*, 9652.
Works at Croydon greatly improved, *Reynolds*, 9682–3.
Odours smelt at South Norwood, but they have had no effect on health, *H. Smith*, 9429–35.
Irrigation does not cause disease, *Sutherland*, 8230, 8245.

SEWERAGE:
Eton, *Barton*, 4756.
Richmond, *Beard*, 6208–19; *Warwick*, 6125–6, 6141, 6143, 6177–9.
Windsor, *Brown*, 4865–907; *Menzies*, 4514–34; *Phillips*, 4731–8.
Kingston, *East*, 5046–50; *Gould*, 5911–16; *Mercer*, 5964–5.
Worthing, *Edgar*, 7791–7; *Harris*, 7927–8.
Oxford, *Galpin*, 416–21, 435–49, 476–90, 425–6; *Randall*, 623–7; *Ward*, 1321–9, 1339–45.
Eton College, *Goodwin*, 4111–41; *Barton*, 4770.
Croydon, *Johnson*, 8251; *Latham*, 8330–57, 8372–3.
Petersham, *Maybury*, 6427.
Lechlade, *Milward*, 7284.
Reading, *Rogers*, 2845, 2867, 2873–4, 2855, 2859, 2884–7.
Great Marlow, *Rolls*, 7436.
Surbiton, *Walpole*, 5819–22.
Kew, *Maybury*, 6427.
Intercepting lines of sewers might be made on the two sides of the Thames; it is a question of outfall, *Simpson*, 5513–14.

SHIELDS, F. W., Esq., M. Inst. C.E.:
Describes a scheme now before Parliament for purifying the upper Thames by intercepting and utilizing the sewage of towns up to and including Oxford, 9543–9624.

SIMONDS, H., Esq. (brewer in Reading):
Pollution of Kennet by sewage, 3306, 3310–11: by gas tar deposited in former years and still lying at bottom of river, 3309: by refuse from brewery, 3332–3: by refuse from factory (now removed) for making paper out of wood pulp, 3317–22: by refuse from a tannery, 3306–8. *Navigation* in decay, river in parts silted up, 3326: will never pay commercially, 3329. *River management.*—Commissioners too numerous for a working body, 3330. *Drainage* above Reading has greatly accelerated floods; the Kennet in flood, whilst Thames is clear; floods remain of shorter duration, 3335–43: drainage of land is injured by canalization of Kennet, 3347–56.

SIMPSON, J., (of Surbiton), Esq., C.E.:
Is engineer to the Chelsea and Lambeth water companies, and consulting engineer for the supply of water to Windsor Castle, 5407–9: has known the Thames intimately for 50 years, 5410. *Waterworks.*—Five companies pump water from the Thames immediately above Kingston, 5411: thinks the daily volume taken from the river by these companies has never exceeded 60,000,000 gallons per day, 5417: it is a most material thing to keep up the weirs of the upper Thames, as they greatly regulate the supply of water, 5418; obtain filtering sand by ballasting principally from above Moulsey, 5421: Chelsea Company pay 300*l.* a year to Conservators; Lambeth Company pay but 200*l.* a year, but has paid a premium of 1,000*l.*; Lambeth Company supply 28,000 houses, and the Chelsea Company 25,000—5435: the quantity per head now supplied is about 30 gallons, 5439: in extreme floods, a rise of 11 ft. 10 in. above summer level represents with the increased velocity probably as much as 70 times the dry weather volume, 5441–3: the Lambeth and Chelsea companies are limited to 20,000,000 gallons per day to each company, 5454: companies would probably consent to an increased payment to the Conservators if the river were improved, 5459–60, 5538–9: would be most desirable to construct im-

Simpson, J., Esq., C.E.—*cont.*
pounding reservoirs, on a proper scale, beyond Reading and Oxford, 5441. *Condition of River.*—Weeds not a serious difficulty, though more so than formerly, 5422: thinks it is difficult to state the river has been affected by the drainage works carried out in Windsor and other places, 5423: great carelessness shown all along the river side in allowing refuse to wash into the river, 5529–33. *Management of river.*—Objection to separating the management from the landowners and others who are interested above, 5462. *Navigation.*—Steam dredging would be useful, 5480: locks all require regulating, and to be constructed with bricks, with stone coping, 5482. *Weirs* disarrange the bed of a river for a time, but if attended to, are not difficult to deal with, 5492. *Flashes* dangerous and extravagant, and should be abolished altogether, 5501–9. *Traffic.*—With energy and perseverance the traffic of the Thames could be restored so as to be profitable, 5478–9: this need not injure the railways, as there are goods that the railways do not care much about, 5541–3: many towns lie away from the railways, and thus traffic involves land carriage, 5548. *Romney weir and lock.*—Particulars of proposed repairs, 5464–17. *Sewerage.*—Intercepting lines of sewers might be made on the two sides of the Thames, but it is a question of outfall, 5513–14.

Smith, Mr. H. (of Eldon Park, South Norwood):
Since the irrigation scheme came into operation offensive odours have been smelt at his house, particularly in the morning and evening, which he attributes to the works; these smells were not perceived previously, 9429–34: but they have had no effect on himself or family, 9435: smell from the ditches was greater than from the works, 9439.

Smith, R. A., Esq. (of Richmond), vestry clerk:
Committee was appointed for utilizing the sewage, who memorialized the Home Secretary, but no answer has been received, 6073.

Southby, T. H. (of Carswell), Esq.
Confirms the evidence of Mr. Williams and Mr. Wood, 7056–7.

Spearing, T. B., Esq. (land agent):
Floods are injurious to finer grasses, if allowed to remain on land more than seven or eight days, 2681–9, 2722: if floods could be only kept off, land below Oxford would be benefited 10*s.* per acre; if water could be both brought on and kept off at will, 20*s.* per acre, 2710–14: roots of finer grasses are not lower than eight inches below the surface, 2696, 2699: hence water in river during summer should not be at a higher level than that, 2690–91: but occasionally it may be, 2727–28: ground ice, 2733–53. *Water supply.*—Wells in valley of Thames rise and fall with river, 2692–95. *Sewage* of Wallingford Union now applied to a garden, 2700–6. *River surface* requires scavenging from dead animals, &c., 2753–8.

Stacy, Mr. J. H. (manager of the University paper mill at Wolvercot):
Water power.—6 horse in summer, 24 in winter, 640: available all the year round except in very high floods, 645–6: worth 10*l.* per horse power per annum: loss of water power might be estimated at 150*l.* per annum: now supplemented by 100 horse steam power which costs 20*l.* per annum per horse power, 708–18: if he had to begin over again, would take advantage of water power, 718*a*–22. *Weirs.*—No alteration in height during last 10 years: regulation height of water observed and enforced, 670–7: few complaints of water being penned back, 737. *Flashes.*—Are passed twice a week when boatmen require it, 678: we do not draw overnight expecting flash to come, but while flash lasts, we put on extra wheel, and so get six hours extra work: even then we cannot use all the water: to millers who have no extra wheel much water is wasted: if water came regularly instead of by flashes, our mill would in summer get eight horse power instead of six, 678–83, 704, 765: never knew a flash to cause a flood, 753–4. *Locks.*—No pound locks: Godstow gates so out of repair that water in reach above can never be kept at regulation height: consequently fall at King's weir is increased by two feet, and a proportionately greater quantity of water wasted when a boat passes—a pound lock urgently needed, 697, 739–40. *River bed.*—Worse every year, 684. *Weeds.*—Are cut by the miller, and sent floating down to next mill, 687–692. *Floods.*—Come down in large volume and in 36 hours instead of 48, after rain, 664–9. *Volume of water in river.*—Gauged: statistics, 756–76. *Paper mill.*—At Wolvercot mill, 10 tons of paper are made per week, 798: requiring 2,250,000 gallons of water, 799: and 12 or 13 tons of rags, 780: and for chemicals, 7 cwt. of alkali, 818: 1 ton of lime, 865: and 7 cwt. of bleach, 805. *Process.*—Rags are cut and dusted, 781–2: boiled in boiler with alkali and clear solution of lime, 784, 866, 867: then washed in engine, 787: then bleached in engine with bleaching liquid, 802, 803. *Waste products.*—The water from the boilers amounting to about 2,000 gallons each time is sent into the river, it discolours stream for a few yards but does no harm, 811, 853: the water from the washing engine is also let into the river, it is clear and does not hurt fish, 792–96: the whole body of water could not be disposed of otherwise than into the river, 809, 810: the $2\frac{1}{2}$ tons of rags which are lost weekly in process of manufacture thus accounted for—15 cwt. sent to inferior makers, $1\frac{5}{8}$ tons are lost in cutting and dusting, and are used as manure on the mill land, would be worth 2*s.* 6*d.* per cwt. to sell: half a ton goes out into river in shape of fibre with water from boilers, 827–837: the alkali goes out from boilers into river: 7 cwt. are worth 60*s.* and it would not answer except on a large scale to try to recover it, 838, 845: of the lime (from which is made solution of lime) $\frac{9}{10}$ is used for manure, $\frac{1}{10}$ is in suspension in the solution and passes from boilers into river, 866–7: of the bleach used to make bleaching liquid the material is always limed, 806–8: if thrown into river, would kill all the fish, 850: no complaints of steam having been fouled, but there are no immediate neighbours, 814, 848, 849: the water 20 yards from mill-tail is used for ordinary purposes: no more refuse than from a farmyard, 855–6: Parliament might compel other millers to observe same care as to river as is voluntarily observed at Wolvercot mill, 851–2: but if it prohibited all refuse being cast into river, paper-making trade would stop, 846–7: mills have usually not large enough sites to establish settling tanks, 846: same considerations apply to manufacture of paper from Esparto grass as to manufacture from rags, only more chemicals are required, 824: paper-making trade has lately increased, 653.

Stallwood, Mr. H. (of Great Marlow):
Was formerly surveyor and inspector, under Nuisances Removal Act, 7518. *Drainage.*—Generally by cesspools, 7520–1: no regular system of sewerage, 7524: in a court in Marlow the well water was injured by filtration from cesspools, and during the prevalence of cholera, that court was one of the principal places affected, 7526–8: some steps have been taken to remedy the defect, but not effectually; fever still prevails there occasionally, 7530–5. *Water supply.*—Obtained from wells sunk in the chalk, 7525. *Sewer.*—Complaints have been made of smell from town end of the brewery sewer, but not of the river end, 7539: refuse from the gasworks does not run into the river, 7541.

Stephens, C., Esq. (chairman of Reading Water Company):
Water supply.—Provided by a company out of the Kennet, two miles above the town: water is pumped into reservoirs, and there drawn through filters: supply is constant with a pressure of 60 or 70 feet in the town: the Kennet sufficient to meet a much greater demand: pumping power by means of water wheels except for high service; charges and income of company, 2899–2911, 2915–2926, 3501–6: company purchased their right to take water from Kennet Navigation Company, 2938: water on analysis was found not to have been polluted by refuse from paper mills three miles higher up, but owners of mills undertook to provide filter beds, 2912–14: same company supplies water for streets and railways, from independent source in middle of town, 3508: paying 8*l.* per annum to St. Giles' mill, 2938. *River management.*—Present body unwieldy, even for elective purposes, 2931–48: county magistrates unfit to be elective body, 2948–49: local working committees of service, 2931: river above Oxford should be

STEPHENS, C., Esq.—*cont.*
made navigable, 2945. *Tolls.*—Insufficient security for any money to be advanced, 2951: rate would be objected to, 2952: Government should assist, 2934.

STYLES, Mr. S. (of Isleworth):
A new lock and weir should be put up for the benefit of the banks and navigation, 6662–3: water is much lower and fouler than hitherto, 6664, 6668: obstructions to navigation, 6671–2:

SURBITON:
Extent of district of Surbiton Improvement Commissioners, *Walpole*, 5817; assessable value, 5823.
Water supply, *Walpole*, 5816.
Sewerage, *Walpole*, 5819–22; cesspools, 5824–5.
Sewage passes into Lambeth waterworks sewer, and so into the Thames, *Walpole*, 5834–5.
Utilization of sewage, *Walpole*, 5858–60.

SUTHERLAND, Dr. W. (of Croydon):
Agrees entirely with Dr. Carpenter's evidence (q.v.), 8222: epidemic which broke out soon after construction of the irrigation works was chiefly attributable to want of ventilation in the sewers; cases of fever last autumn traceable to sewage works or drainage were very few, 8223: when Croydon system of sewerage was first started there were no means of ventilating sewers, consequently many persons, chiefly servants, were attacked, 8223: the recent outbreak of fever was ascribable to atmospheric causes, 8224: sinks in small cottages should be outside the house, 8224: does not believe irrigation causes disease, 8230, 8245. *Water supply* of Norwood from Lambeth Waterworks; it is not sufficient, 8231: before the sewerage was carried out there were many cases of diarrhœa caused directly by well water poisoned by percolation of sewage, 8240: has attended several cases of typhoid fever at South Norwood during last six years, 9130: during last 12 months there have been only four deaths from fever in Norwood, 9136: causes of typhus, 9137–41: fever has prevailed in many parts of England during the last 12 months, especially during the last quarter, 9144: never had a complaint of offensive smells from his patients in the neighbourhood of Norwood, 9148: nor ever heard of any in the summer time, 9157: though that is the part of the year when odours are more likely to arise, 9162: present mode of dealing with sewage better than any other, 9164: irrigation with sewage water tends to reduce temperature of water and earth, 9170.

TAUNTON, J. H. (of Brimscombe Port), Esq., M.J.C.E.:
Is engineer of the Thames and Severn Canal, 7182: Diminution in traffic on the upper Thames is caused by competition of the railway, 7184: the summit level of the canal is maintained by pumping water from Thames Head, 7185–6: and from the Churn, 7190, 7241: a large portion of which is returned to the Thames, 7192, 7194: a great deal of the water is lost by soakage in the Great oolite, 7189–91: the traffic on the canal having fallen off it is proposed to convert parts of it into a railway, 7233–6. *Water supply* of Stroud described, 7197–9: the Thames and its tributaries as sources of water supply, 7200–20: geological formation (fuller's earth and oolite) renders the locality unsuitable for constructing reservoirs, 7225–8. *Navigation.*—Ample water here for purposes of navigation, 7204, 7206: navigation of the Thames is a practical check to railway monopoly, 7236: the navigation of the upper Thames should be maintained, 7248: conflicting interests form the great obstacle to improving the river, 7250: witness delivers in a statement of Robert Sisum, a bargeman on the Thames for 50 years, stating the bad condition of the river as compared with former years; the pound gates, horse bridges, and weirs are very defective; if the navigation were well kept up a deal of trade might be done, 7263.

TAXATION:
Landowners would not like to be taxed for embankments, *Bennett*, 7396; *Harcourt*, 147–50.
Would be great difficulty in raising funds unless Government gave assistance, *W. Blandy*, 3111–14.
Residents should not be taxed for improving river; it is a national work, *Bohn*, 6592.
Riparian owners would not object to be rated, *Chillingworth*, 6451–3, 6462; *Donnithorne*, 6100.
Towns benefited by the navigation would not object to contribute, *Exall*, 3010.

TAXATION—*cont.*
Objection to the extension of area of rating beyond the immediate banks of river, *T. Glossop*, 6603–5.
Cost of improving river should be met by local taxation, *Gould*, 5935–6.
Water companies and those who use the river should pay for its improvement, *Graham*, 8622.
If necessary a moderate tax might fairly be levied on riparian proprietors, *Hedges*, 1712–14.
A county rate should be levied to maintain Thames, *Hester*, 1478–9.
Area of taxation should be that liable to floods, *King*, 8835.
A very small rate would be sufficient, *Knox*, 7689.
The whole drainage area included by any scheme of intercepting sewage might be fairly asked to contribute to expense, *Nelson*, 5286–7.
Companies would probably consent to an increased payment to the Conservators if the river were improved, *Simpson*, 5459–60, 5558–9.
Would not object to moderate rate, *Vansittart*, 7676.
Surbiton Improvement Commissioners would readily assent to a rate for conveyance of sewage from the district, *Walpole*, 5859, 5866.

TAYLOR, Mr. J. O. (of Reading), manager of Gas Co.:
States annual make of gas; rate of charges; coals consumed, 3036–8: refuse from gasworks does not pass into the Kennet, 3061. *Sewage* should be utilized, 3070: but it must first be proved that it can be done profitably, 3071. *River.*—Bottom of river very foul from old deposits of gas tar, 3077–8: the river at Reading is not so pure now as formerly in consequence of the few boats passing up and down, 3080.

THAMES:
Geological character of the upper valley of the Thames, *Clutterbuck*, 1.
Geological character of valley below Oxford, *Phillips*, 2506–8.
Springs feeding the Thames, *Phillips*, 2505.
Volume of water in river at Wolvercot gauged; statistics, *Stacey*, 756–76.

THORP, J., Esq. (deputy chairman of Thames Conservancy Board):
River if put into proper condition might carry on a fair traffic, 9016: no necessity for representation of upper Thames at the board, 9017: constitution of Thames Commissioners, 9019–21: debt of Conservators, 9024–6: would decline to take bond debt of Thames Commissioners; Government must deal with that, 9025–7: Thames Conservancy could manage upper as well as lower Thames, 9028: saving clause in 20 & 21 Vict. c. 147. as to throwing ballast, &c., into the river should be repealed, 9030–4: "Smoke Act" has not been enforced on the Thames, 9036–9: works carried out by Conservators, 9041: power should be given to Conservators to maintain banks, 9043: board has not allowed impurities, except sewage, to pass into river, 9044.

TOLLS:
Would be no objection to the taking of tolls from pleasure boats, *Bohn*, 6566–7; 6591.
Weir keepers may levy tolls; the right is included in the rental, *Castle*, 1939.
Every lockowner would give up his right to lock dues if the commissioners would keep the locks in repair, *Graham*, 8650.
Commissioners should have power to fix and vary tolls, *Graham*, 8656.
At Windsor lock paid to the Crown for benefit of royal farm, *Ingram*, 4484–5.
A small toll might very fairly be imposed upon pleasure boats passing through Teddington lock, *Nelson*, 5373.

TOWERS, Mr. W., secretary of the gas company and registrar of births and deaths at Windsor:
Writes to state that the company discharge into the sewer none of the solid or liquid products obtained in the process of gas making, and transmits a copy of "Some results of the Census of 1861 for the "Windsor Union," *page* 163.

TOWING-PATHS:
Belong to navigation, but are used by public, *Adams*, 132–9.
Not kept in repair, *Bennett*, 7399.
When washed away, commissioners take from the land enough to replace them, *Castle*, 1916.

TOWING-PATHS—*cont.*

Considered as private property, but people not warned off, *Drake*, 1180–83.

Considered as public roads, but not for wheeled carriages, *Treacher*, 4830–2.

At Windsor maintained by the Crown, *Ingram*, 4478.

If washed away, have been replaced by others made further into the meadows, without asking leave of owners of land, *Treacher*, 4828–9.

TOWLE, John, Esq. (alderman of Oxford, mill-owner):

Owns three mills just below Oxford, two of which he works himself, 1504–5. *Water power.*—At the three mills, 20-horse, 12-horse, and 8-horse power respectively, at the first also 12-horse steam power; is available all the year round, except occasionally in floods, 1506-16. *Mills.*—From want of proper control hinder navigation; some millers will not draw for the flashes, 1528–31, 1611–17: millers, however, suffer from flash system, 1609–10: mills also cause floods; each miller does as he likes, raises the sill of his lasher at pleasure; puts up boards above his own lasher and pulls down boards put up by the next miller at lasher below, 1547–60, 1568–73, 1579–80: at Sandford especially sill of lasher has been raised, 1543–4: and in consequence roads are impassable in flood time, 1575: Sandford throttles the water, 1587, 1593–6: the waterway has been tampered with and is too small, 1597–8: but mills are valuable property and can be worked to the advantage both of the land and navigation, only control of water must be taken out of millers' hands. Millers alone take care of river, clean out channel, and keep up banks, 1599–1604. *Paper mills.*—No bleach is used at his mills, 1621: refuse of rags and lime go to the land as manure, not into the river, 1635–7: alkaline liquid from boilers, after having been used once or twice goes (as dark coloured as treacle) into river, but might be kept out of river and used for manurial purposes, 1640-2, 1659-61: wash water from engine likewise is let into the river, 1645: in manufacture of cardboard out of rope no chemicals are used, water passes away sweet and clean, 1648, 1655: generally it would be no hardship to paper manufacturers to be prohibited from casting any refuse into river, 1662. *Navigation.*—Flashes are bought, but not from commissioners, 1612–14: and are sometimes appropriated by millers, 1531, 1556, 1611, 1619: this ruins traffic, 1524–6: flashes are on the whole injurious to miller, 1609: meaning of high water-mark is disputed, 1531. *Floods.*—May be expected worse than ever; come down more quickly; used not to appear till third day after rain; causes of floods (mills improperly managed) might be removed without injuring private property, 1532–8: meadows that have been flooded are unwholesome for cattle in autumn; but fatten sheep, unless after a wet summer, when sheep are liable to take the rot, 1682–1684. *River management.*—Commissioners neglect the river, and are quite an impracticable body, 1545–55, 1583–5. *Sewage.*—Of Oxford in the Isis blotched paper, and rendered the discontinuance of manufacture of white paper necessary, 1519–20, 1664–5: it also made men at mill ill, 1668: matters will be worse when Oxford completely sewered, 1669: sewage should be applied to land, 1670–1.

TRAFFIC:

No hope of traffic above Ensham, *Adams*, 176–81.

Pleasure as well as business traffic might be opened up, *Andrews*, 3149.

Improvement of navigation would enable water carriage to compete with railways, *Andrews*, 3165; *Exall*, 2967–8.

Coals come to Reading by railway 3*s*. or 4*s*. cheaper per ton than they used to come by river; impossible to restore traffic to river, *Ayres*, 3777-95.

Would increase if navigation were improved, *Barnes*, 6540–1; *Cutler*, 4954–7; *Graham*, 8571; *Hayne*, 7581–2; *Jones*, 3831–2; *Knox*, 7686; *Pinniger*, 7166.

Number of boats passing through lock at Lechlade much diminished, *Basson*, 7131–2.

Railway competition would prevent increase of traffic even if navigation were improved, *Berry*, 6622–26; *Chamberlain*, 4066, 4071; *Hurley*, 3527–35; *Rolls*, 7414.

Lost to river, partly through railways, partly from excessive tolls on river, *Blackwell*, 2828–37.

Eventual success of river traffic is doubtful, *Blackwell*, 2840–1; *Castle*, 2030.

TRAFFIC—*cont.*

No river traffic between Oxford and Ensham for 12 or 14 years, *Bossom*, 348–50.

Not the least chance of river traffic being restored, *Chamberlain*, 4035; *Treacher*, 4822.

Pleasure traffic is increasing, *Cutler*, 4949; *Darvill*, 3888.

Might be greatly increased if steam tugs were placed on the river, *Darvill*, 3907.

Would be considerable if the commissioners had it in their own hands, *Hayne*, 7580.

Reasons for preferring coals to be conveyed by river rather than by railway, *Jones*, 3844-51.

Even at present rates, water carriage would save to paper mill near Reading 250*l*. per annum, but it is too uncertain to be available, *Lloyd*, 3385-401.

In future the river will principally be kept up for pleasure purposes, *Nelson*, 5377.

Above Staines costs too much for haulage for successful competition with the railway; below Hampton water carriage may be made remunerative, *Nelson*, 5377–8.

Left the river chiefly in consequence of railways, latterly also on account of defective navigation, *Randall*, 551.

Railways the chief cause of diminution in traffic on the Thames at Marlow, *Rolls*, 7408, though defective locks may have some effect, 7409, 7422.

With energy and perseverance could be restored so as to be profitable, *Simpson*, 5478–9.

If river were put in repair sufficient money could not be earned to maintain the works, and to pay interest on the money borrowed, *Treacher*, 4821.

Would not have been injured so much, if commissioners had had larger powers, *Vansittart*, 7652.

Might be restored if a fair system of tolls were introduced, *Vansittart*, 7652–6.

No hope of restoring to river coal traffic from Forest of Dean to Oxford, *Ward*, 944–83.

Improvement of navigation would not restore the traffic, unless the charges could compete with those of the railways, *Wright*, 7480, 7506.

TREACHER, Mr. J., of Twyford:

Has been acquainted with the river Thames for more than 30 years; son of the late surveyor to the Thames Commissioners, 4790-6. *River management.*—Bondholders have received too much interest and too long after the traffic had fallen off, 4797-800: if river were put in repair is certain that sufficient money could not be earned to maintain the works and pay interest on the money borrowed, 4821: sees no chance of raising funds from the navigation to pay off the present bondholders, 4822. *Condition of river.*—Very bad, and works in a dangerous state, especially the locks, 4801-3. *Mills.*—Millowners are a great evil to the Thames, from their selfish way of penning the water back too long, and thus causing floods, 4804–7, 4824–5: maintenance of tolls paid to millowners has always been one of the great hindrances to the navigation, 4839. *Flashes.*—Were ordered to be done away with 10 or 12 years ago; was not aware that they are still sent down twice a week, 4808-18. *Traffic.*—The falling off of traffic on the river has been entirely caused by the railway which carries goods quicker and cheaper, 4819–20: is certain that the traffic could not be got on the river again. 4822. *Banks.*—Much washed away, and undermined, 4826. *Towing-paths.*—If washed away would have been replaced by others made farther into the meadows, without asking leave of owners of land, 4828-9: considered as public roads, but not for wheeled carriages, 4830–32. *River bed.*—A great deal of ballasting has been done in all parts of the river by the Commissioners, and the gravel put on the towing-paths, 4833–5: weeds generally do more good than harm to the navigation by keeping up the water in low water time, 4836. *Locks and weirs.*—Several of the old locks belong to the Commissioners, who have bought them to relieve the navigation of the old lock tolls, 4848: a small part of Sonning weir belongs to the Commissioners, who keep that part in repair; the other part belongs to the millowners, 4851.

TREADWELL, Mr. R. (keeper of Pinkhill lock and Bowles weir):

Flashes.—Sells flashes to bargemen who come up to fetch it: flashes never flood the land, 1834–46, 1899–1902. *High-water mark* raised two inches at Bowles weir by Commissioners, 1847–51. *River bed* has silted up in places; no ballasting done for

TREADWELL, Mr. R.—*cont.*
40 years, 1852–7. *River banks* have not altered in the last 50 years, 1877, 1877*a*, 1913. *Navigation.*—Four or five barges a week used to pass from the west; now all that traffic is lost, 1855–66. *Floods*, on account of drainage, appear one day sooner after rain, and go off more quickly, but are not so high as formerly and not more frequent, 1867–72: they improve crop, but in autumn the land is not fit for grazing purposes, 1893–8: sometimes Evenlode is flooded, but not the Thames, 1873–4. *Fishery* for 1¾ miles is worth about 13*l.* per annum, 1829.

TRIBE, W. (churchwarden of Worthing), Esq.:
Health of Worthing improved by the irrigation works, 8121, 8129: irrigation works cause no nuisance to adjoining property, nor have any complaints been made, 8125–6: diminution in amount of parochial relief attributable to improved health, 8132, 8134: waterclosets to every house, 8135.

TRIBE, Mr. W. F. (of Worthing):
States the resident population of Worthing and number of visitors, 7866–8.

TURNER, Mr. C. (of Kelmscotte), farmer:
An authority should be constituted to control the drainage, with power to excecute necessary works, 6864, 6877: floods are beneficial to meadow, but not to arable land, 6865: river is in a worse state than hitherto, 6866–9: weirs are now an obstruction, but would not be if formed on a better principle, 6875–6.

TWICKENHAM:
Population of, 6080.
River, condition of, at, 6602, 6689.
Sewerage of, 6084.

UNDERHILL, Messrs. W. & H. (wholesale grocers in Oxford):
Desire to see river traffic between Oxford and London restored for heavy goods, 1098: railway accommodation now bad, 1107: railway lowered its tariff in order to compete with the navigation; having ruined navigation has raised its tariff higher than ever, 1117–21: Thames Commissioners inefficient, 1124: navigation should be transferred to a company, 1121, 1125–35: if old lock dues were done away, rates might be greatly reduced, 1112.

VANSITTART, G. H. (of Great Marlow), Esq.:
Floods are injurious to ploughed land, but not to grass land, 7633: means should be adopted to prevent the water remaining so long on the land, 7635: improved drainage has partly effected this, 7637: would relinquish the advantages of flooding if preserved from over-floods, 7636. *Weirs and locks*, if in good order, would prevent injury from penning up water, 7639: a fixed overflow weir would not prevent millowners interfering with the discharge, 7643: there should be a regular inspection of, 7650: weirs at Marlow render meadow land subject to summer floods, 7673: no inconvenience from depth of water in locks, 7666. *Water* comes down more quickly now, 7636: but in diminished quantity, 7644: flashes are not now used as there is sufficient depth for barges, 7645. *Thames Commissioners*, considering the funds at their disposal, have not done badly, 7649. *Navigation.*—Traffic on the river decreasing, 7651: railways principal cause of decrease, but the traffic would not have been injured so much if commissioners had had larger powers, 7652: if a fair system of tolls were introduced trade might be restored, 7652–6: irregularity of delivery has injured the traffic, 7659: has not noticed any ill effect of sewage from brewery drain, 7661. *Fishery.*—Fish diminished in quantity from the refuse thrown into river, 7662. *Weeds*, effect of, 7674–5. *Taxation* would not object to a moderate rate, 7676. *Thames Conservancy* should have control of river, upper Thames district being represented by four or five members, 7695.

VERRALL, Mr. W. (of Worthing), assistant overseer:
Amount expended in parochial relief in Worthing has decreased in consequence of healthier condition of the poor, 8010: health of the town decidedly improved, 8013: no complaints as to applying sewage to land, 8014.

WALFORD, T. L. Esq. (medical officer of Reading Union):
Sewage Pollution.—Reported to board of guardians as to filthy state of Kennet below Blake's Bridge, 3797, 3804: recommended stream to be cleaned out and arrangements to be made for raising locks once or twice a week; recommendations adopted, 3808–9: Kennet used as drinking supply to poor; witness does not know of ill effects following, 3802–3: houses on banks of Kennet unhealthy because from their low site imperfectly drained, 3807.

WALPOLE, C. (of Surbiton), Esq., chairman of the Surbiton Improvement Commissioners:
Extent of district, 5817; assessable value, 5823; Surbiton divided into four districts, each being rated separately, 5832–3. *Water supply* of Surbiton from Lambeth Waterworks, 5816. *Sewerage.*—Amount expended, mode by which raised, 5819–22: some houses still use cesspools, 5824–5. *Sewage* passes into Lambeth Waterworks sewer, and so into the Thames, 5834–5; the waterworks in purifying the supply, return large body of water to the river, so that the sewage is quite inocuous, 5841: solid matter is prevented going to London by Teddington lock, 5843; and by degrees it may accumulate at the weir, 5844, 5848: never perceived any offensive smell from the river near Surbiton and Kingston; if there is it must arise from other causes than Surbiton sewage, 5850–2: Surbiton commissioners proposed an intercepting sewer to be connected with Metropolitan low-level sewer at Putney, but Metropolitan Board would not sanction the connexion, 5857. *Utilization of sewage.*—Difficulty of finding land at Surbiton for, 5858: several places should be joined for the purpose, 5860. *Taxation.*—Surbiton Commissioners would readily concur in a rate to convey sewage from the district, 5859, 5866.

WARD, W. Esq. (Chairman of Local Board of Health and late trader on the river):
Navigation.—The Thames Commission now at a dead lock: in debt, no power to borrow, and works falling into decay, 930–6: navigation from Lechlade to Oxford now at an end, but upper part of river must be attended to as source of water supply to lower part, 937–9: no hope of restoring to river coal traffic from Forest of Dean to Oxford, not even if proposed railway be made from Forest of Dean to Stonehouse; if coals will come to Oxford from Forest of Dean instead of (as now) from Midland county coal fields, they will come by railway, not by river, 944–983. *Flashes* flooded the land above Oxford even in driest time of summer, 940–3. *Coal traffic*, 1313–20. *Projects of Sewage of Oxford*, 1321–9, 1339–45. *Sewage.*—Towns ought to be required to apply sewage to land and have compulsory power to buy land, 1330–8. *River management.*—A change must be made, a small working body appointed, 1346–57: one board enough for whole of upper river, 1361–6: Government ought to make a grant to the maintenance of the Thames as to a national object, 1370–81. *Navigation.*—Low-water mark should be raised, and flashes abolished; a flash is about 4 ft. of water, is purchased from lock-keepers, and is frequently appropriated by millers, 1358–60, 1363–9.

WARWICK, R. A., (of Richmond), Esq., M.D.:
Much less water now than hitherto, and its state is also worse, 6117, 6120. *Water supply* of Richmond taken above Teddington lock, so that the state of the river does not affect it, 6123–4. *Sewerage.*—Richmond is not completely sewered; the sewage runs into the river; a number of cesspools exist, 6125–6: if Richmond is not sewered upon scientific principles, higher parts would be in worse condition, 6141: but that is the duty of the authorities, 6143. *Disease*, none attributable to the state of the water; typhoid fever prevails in the lower part of the town, but it is due more to the condition of the houses and to defective drainage than anything else; improved drainage would mitigate this, 6127, 6131–2, 6169: gastric fever is promoted by use of bad water, 6160–1: much less diarrhœa since water supply improved, 6180. *Death-rate*, 6133–5; compared with other places it is high, 6137, which is caused by defective drainage, 6138–9; it is also raised by other causes, 6152–4: means taken for comparing relative mortality in upper and lower parts of the town, 6147–51. *Weir* and lock would be of no advantage unless the sewage was cut off from the river, 6173. *Water supply* of Richmond, 6177–9.

WATERWORKS:
Of Windsor described, *Cutler*, 4317–79.
Of Oxford described, *Downing*, 986–1072.
Pumping stations of the London companies are above the outfall of the Kingston sewage, *East*, 5060.
Five companies pump water from the Thames above Kingston, *Simpson*, 5411. *Wheeler*, 6241.
Daily volume taken never exceeds 60,000,000 gallons per day, *Simpson*, 5417.
Lambeth Company's waterworks supply 28,000 houses, Chelsea Company's works 25,000, *Simpson*, 5435.

WATER COMPANIES:
Are authorized to take daily 100,000,000 gallons; they actually take 73,000,000, *Bohn*, 6577–8.
Should contribute to expense of improving river, *Bohn*, 6581; and to expense of lock above Teddington, 6594.
If compelled to pay for water taken from river would be a legitimate source of revenue, *Darvill*, 3929–32.
Would be benefited by formation of weirs and ponds on the Upper Thames, and the purification of river, and should pay annual rent charge, *Leach*, 8926–9.
Should be required to send in weekly a return of daily quantity abstracted, *Leach*, 9000.
River never seen so low as in 1865; attributed to the water companies almost entirely absorbing what fresh water comes down, *Nelson*, 5249–50.

WATER SUPPLY:
No one knows when water once poisoned becomes safe again; hence only true principle is to keep sewage out of river, *Acland*, 2147, 2151.
Of Oxford is partly from wells, *Galpin*, 427–8; some wells being polluted by cesspools, *Acland*, 2141–6. *Rolleston*, *page* 74.
Of Oxford is really from Thames, *Adams*, 292–301.
Of Worthing not sufficient, *Barker*, 8155.
Of Worthing is obtained from the chalk, and is very good, *Greenfield*, 7419–20. *Harris*, 7945.
Of Eton is good, *Barton*, 4767.
Of Eton College, *Goodford*, 4130–4.
Not the quantity but quality of organic matter in water makes the water poisonous, *Brodie*, 1493, 1502.
Of Richmond, *Chapman*, 6030. *Warwick*, 6117, 6120, 6123–4.
Of Isleworth obtained from springs, *Day*, 6644.
Each river basin should supply water to inhabitants within the basin, *Denton*, 8708; water should be taken from spring heads, and equivalent given to the river from reservoirs, 8723.
Of Croydon, *Johnson*, 8284–90, 8311. *Sutherland*, 8231.
Of Windsor very good; obtained from the Thames at Eton, *Jones*, 3842–3.
Of Hampton Wick is from wells and from Grand Junction Waterworks, *Miles*, 5973–6.
Theory of springs, *Phillips*, 2517–24: how far water takes its character from subsoil, 2525–30; storage of water possible by construction of subterranean tanks, or by the making of artificial springs, 2564–9; an increased supply obtainable by tapping natural sub-reservoirs of water in limestone, chalk, and oolite formations, such as exist in Thames valley, 2555–63, 2571–84.
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Of Lechlade, *Pinniger*, 7178–80. *Powell*, 7332–3.
Of Great Marlow, *Rolls*, 7442–3.
Of Reading, *Stephens*, 2897–26, 3501–8.
Of Stroud, *Taunton*, 7197–9.
Of Surbiton, *Walpole*, 5816.
Of Kingston, *Wilkinson*, 5129–33.

WATTS, Mr. T.:
Reads a paper indicating method of purifying sewage on the banks of a stream, 3084.

WEIRS:
St. John's College repairs a weir at its own expense, for the navigation, *Adams*, 171–5.
At Englesham and St. John's Bridge injuriously affect the land, *W. Arkell*, 6820–3.
Lock and weir at Isleworth would raise the water at Kew, *Barnes*, 6546–7.
At Isleworth would not alter water below, *Berry*, 6620.
Chiswick a good place for a weir, *Barnes*, 6557.
A weir above Teddington would improve the river, *Bohn*, 6565.
Require regulation; should be some authority to compel the weir tackle to be drawn upon the coming of a flood, *Clutterbuck*, 4–6.

WEIRS—*cont.*
If weirs were abolished, water would be diminished in depth, *Cresswell*, 7614.
The weir at Windsor, as it keeps up the head of water, is of more service than the lock, which is exclusively for the navigation, *Cutler*, 4946.
Cause hole below and bank beyond, *Drake*, 1234–50.
Objections to weir at Isleworth, *Leach*, 8966–86.
Weir at Brentford should be relatively higher than that at Teddington, *Leach*, 8972.
Most material to keep up weirs, *Simpson*, 5418.
Disarrange the bed of a river for a time, but if attended to are not difficult to deal with, *Simpson*, 5492.
Romney weir and lock, *Simpson*, 5464–77.
Complaints of the water being penned back, *Stacy*, 737.
Are now an obstruction, but would not be if formed on a better principle, *Turner*, 6875–6.
At Marlow render meadow land subject to summer floods, *Vansittart*, 7673.
Proposed weir and lock near Richmond would be of no advantage in the long run unless sewage were cut off, *Warwick*, 6173.
Narrowness of weirs between Lechlade and Oxford tends to flood the land, *Wood*, 6974.

WHEELER, Mr. W. (of Richmond), waterman:
Five water companies take water from the Thames above Teddington lock, 6241: quantity of water much diminished, 6242–6, 6302; boats drawing only three or four inches have great difficulty in getting up at low water, 6251–5: water much fouler than it used to be, 6248–9. *Fishing* has largely increased, 6256; not profitable as an occupation, 6278. *Embankment.*—Part of the frontage has been embanked; it would make no difference to boating if the river generally were embanked, as the water would run away so fast, 6257–8; if the river were embanked, there must be a lock and weir, which should be placed down by Isleworth, 6259–60. *Locks* at Pangbourne are in very bad condition, 6264–5. *Fish*, kinds taken at Richmond, 6273–7. *Sewers* smell very badly, as also the banks where they debouch, 6283–6. *Ballasting.*—Conservators regulate taking of ballast, 6290; there is a large bank below Isleworth, running out from the towing-path, but the Conservators take no steps to remove it, except by ballasting, 6292–6301.

WILKINSON, W. M., town clerk of Kingston, Esq.:
Utilization of Sewage.—Proposal to connect Kingston outfall with the main metropolitan sewer, which now extends to Putney; failure of this, from want of sufficient powers, 5173–8: various other means considered, and visits of inquiry made to several towns, but without satisfactory result, 5179–87: report of special committee's engineer on the provision of an intercepting sewer for the entire district, to which work the Corporation would be glad to contribute their fair share, 5188–93: statement of proceedings in Chancery taken by the Thames Conservancy Board to restrain the borough of Kingston from passing sewage into the Thames, 5194–9, 5203–8: chemical properties of sewage, and processes of separation, 5209–20: proposals for a land reclamation and sewage company, 5221–3: increasing rateable value of land at Kingston and other places near the river, making the improvement of the Thames a landowner's question as much as a question or house property, 5224–35. *Water supply* of Kingston served by the Lambeth Waterworks Company, and by wells, 5129–33.

WILLIAMS, Mr. G. T. (of Buckland), land agent:
Parallel embankments should be formed, weirs widened, the high-water mark lowered, and the river cleansed of weeds, 7049–50; the cost should fall upon the land, 7051. *Navigation* if restored would do very little good, 7055.

WINDSOR:
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Fishery at, 4085–6.
Navigation, difficult, 4921.
River, management of, 3864–3921; traffic on, 3888–9: pollution of, increasing, 3990.
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Sewage of, 3839; passes into Thames, 3898–3906, 4400.
Waterworks and water supply of, 4317–79, 4747–9.

Witherington, Mr. C. H. (of Sonning):
Owns a corn mill at Sonning, with two ground shot wheels of about 30-horse power, working head of water, 4ft. 1in., 4166–73: is an old lockowner: the receipts in 1852 were about 96*l.*, but have now fallen to between 25*l.* and 30*l.*, 4179. *Navigation.*—Condition of river for purposes of navigation gets worse, principally in consequence of the silting up below Reading, 4177–8. *Flashes.*—No flashes at Sonning mill; barges have not required them since the new cut was made, 4183–4, 4265–7. *Floods.*—No complaints of flooding by proprietors above his mill, 4186. *Sewage* from Reading 3½ miles distant, is annoyingly felt, although the reach below Reading is both wide and deep, 4252–7: gets worse every year, 4268–70: the smell at the mill aggravated by the accumulation of matter about the paddles of the wheel, 4295–6. *Locks* quite necessary to collect sufficient water for the navigation, 4259: repairs of Sonning lock since 1852 have cost between 600*l.* and 700*l.*, 4261. *Fishery* most certainly falling off through the pollution of the river, 4271–2. *River management.*—Is prepared to give up lock dues at once if some governing body will keep the weirs and locks in repair, 4273: millers consider the mills older than the navigation, and perhaps would not agree to any arrangement for putting a weir at the head of a mill race to maintain the water at a certain level, 4276: is a bondholder; should be ready to take 2*s.* in the pound, 4279: present system cannot go on; all that has been done for years has been patchwork, 4284. *Traffic.*—Tonnage for heavy goods from Sonning to London was 8*s.*; it would be 6*s.* 8*d.* now, 4289; Thames Commissioners have kept the railway as far away from the Thames as they could, 4290: important to millers to have the option of sending either way, by river or railway, 4291: a steamboat might work for excursions, 4294.

Wood, Mr. W. B., (of Chippenham), land surveyor:
Portion of the Thames he embanked is decidedly improved, 6959: describes the embankment, 6960–9: weirs and fishing and navigation rights should be maintained, 6971: narrowness of weirs between Lechlade and Oxford tends to flood the land, 6974: and the land being water logged is reduced in value, 6976: height of the river is not injurious to grass land if embanked, 6977: describes a watercourse he has constructed and its cost, 6977–85, 6994: the value of the land has been considerably improved, 6986: similar improvement might be effected on the whole of the Oxfordshire side of the river 6993: opinion as to draining agricultural lands, 6997–7014. *Taxation.*—The land should be taxed for its improvement, 7015. *Navigation.*—It is desirable to keep open the navigation, but it is doubtful if it would be profitable; it would be a convenience, 7020–1. *Weirs and mill-dams* should be improved and kept up, so as to allow floods to go down, 7022–3, 7040. *Embankments* would give greater scour, and should be carried out on a general plan, 7028–32, 7038.

Woodley, Mr. T. (farmer on banks of Kennet):
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Worthing:
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Wright, Mr. J. (of Marlow), paper maker:
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Wright, Mr. T. (of Temple), agent to Col. Williams:
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POLICE (COUNTIES AND BOROUGHS).

REPORTS of the INSPECTORS of CONSTABULARY for the Year ending 29th September 1865, made to Her Majesty's Principal Secretary of State, under the Provisions of the Statute 19 & 20 Vict. c. 69.

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(PRESENTED PURSUANT TO ACT OF PARLIAMENT.)

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No. 1.—EASTERN COUNTIES, MIDLAND, AND NORTH WALES DISTRICT.

NINTH REPORT of Lieutenant General *Cartwright*, Her Majesty's INSPECTOR of CONSTABULARY for the EASTERN COUNTIES, MIDLAND, and NORTH WALES DISTRICT, for the Year ending 30th September 1865.

To the Right Honourable Sir *George Grey*, Bart., Her Majesty's Principal Secretary of State for the Home Department.

Sir,

I HAVE the honour to lay before you this my Ninth Annual Report of the state and efficiency of the Police in No. 1, or the Eastern Counties, Midland, and North Wales District.

Of the 25 counties under my inspection, I have to report the following efficient:—

COUNTIES.	Population, 1861.
ENGLAND:	
1. Bedford - - - -	121,805
2. Bucks - - - -	160,022
3. Cambridge, with Isle of Ely	140,575
4. Derby - - - -	286,400
5. Essex - - - -	291,924
6. Hertford - - - -	141,209
7. Huntingdon - - -	64,256
8. Leicester - - - -	169,350
9. Lincoln - - - -	343,140
10. Norfolk - - - -	317,295
11. Northampton, and the Liberty of Peterborough.	190,509
12. Nottingham - - -	207,691
13. Oxford - - - -	140,730
14. Rutland - - - -	21,867
ENGLAND—*continued.*	
15. Salop - - - -	217,379
16. Stafford - - - -	630,829
17. Suffolk, East and West -	292,631
18. Warwick - - - -	193,123
19. Worcester - - - -	249,154
NORTH WALES:	
20. Anglesey - - - -	54,609
21. Carnarvon - - -	92,776
22. Denbigh - - - -	104,316
23. Flint - - - -	69,849
24. Merioneth - - -	38,888
25. Montgomery - - -	66,919

Of the Borough Forces under my inspection, I have to report the following efficient:—

EFFICIENT BOROUGHS.	Population, 1861.
1. Alban's, St. - - -	7,675
2. Banbury - - - -	4,055
3. Bedford - - - -	13,412
4. Birmingham - - -	295,955
5. Boston - - - -	15,038
6. Cambridge - - -	26,351
7. Chesterfield - - -	9,835
8. Colchester - - -	23,730
9. Coventry - - - -	40,937
10. Derby - - - -	43,081
11. Grantham - - -	4,954
12. Great Grimsby - - -	11,032
13. Great Yarmouth - -	34,573
14. Hertford - - - -	6,769
15. Ipswich - - - -	37,719
16. Kidderminster - - -	15,399
17. King's Lynn - - -	15,981
18. Leamington (Town) - -	17,452
19. Leicester - - - -	68,168
20. Lichfield (City) - - -	6,893
21. Lincoln (City) - - -	20,995
22. Ludlow - - - -	5,178
23. Newark - - - -	11,562
24. Northampton - - -	32,813
25. Norwich (City) - -	74,414
26. Nottingham - - -	74,531
27. Stamford - - - -	8,044
28. Shrewsbury - - -	23,000
29. Stratford-on-Avon - -	3,672
30. Sudbury - - - -	6,879
31. Walsall - - - -	37,762
32. Warwick - - - -	10,589
33. Wisbeach - - - -	9,218
34. Wolverhampton - -	60,858
35. Worcester - - - -	32,000
36. Newcastle-under-Lyme has lately strengthened its force to an efficient number of Constables.	12,638

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Boroughs consolidated with Counties having Efficient Forces.

BOROUGHS.	Population, 1861.	BOROUGHS.	Population, 1861.
ENGLAND:		England—*continued.*	
1. Beccles - - - - -	4,266	13. Tamworth - - - -	4,326
2. Bury St. Edmund's - -	13,318	14. Thetford - - - -	4,208
3. Evesham - - - -	4,680	15. Wenlock - - - -	16,699
4. Eye - - - - -	2,430		
5. Godmanchester - - -	2,438	NORTH WALES:	
6. Harwich - - - -	5,070	16. Bangor - - - -	6,738
7. Huntingdon - - -	3,816	17. Beaumaris - - -	2,558
8. Orford - - - -	948	18. Carnarvon - - - -	8,512
9. Oswestry - - - -	5,414	19. Denbigh - - - -	5,946
10. Retford - - - -	47,330	20. Flint - - - -	3,540
11. Saffron Walden - - -	5,474	21. Montgomery - - -	1,276
12. Stafford - - - -	12,532	22. Welchpool - - -	5,004

The following Forces remain inefficient either as to number or discipline:—

Boroughs over 5,000 Population.

BOROUGHS.	Population, 1861.
1. Bridgnorth - - - - - - -	6,086
2. Louth - - - - - - - -	10,468
3. Oxford (City) - - - - - - -	28,261

Boroughs with Inefficient Forces under 5,000 Population.

BOROUGHS.	Population, 1861.	BOROUGHS.	Population, 1861.
ENGLAND:		England—*continued.*	
1. Bewdley - - - -	3,071	6. Southwold - - - -	2,032
2. Buckingham - - -	3,847	7. Wycombe - - - -	4,222
3. Daventry - - - -	4,124		
4. Droitwich - - - -	3,123	NORTH WALES:	
5. Maldon - - - -	4,747	8. Pwllheli - - - -	2,795

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GENERAL REPORT.

COUNTIES.

Counties.

The county forces throughout the district are efficient in number and discipline, but I find that there is a great difficulty in retaining men in the service, or of obtaining good recruits, from the following causes, namely,—

Increase of pay to constables, &c.

The pay of the Metropolitan Police Force has been materially increased, and there being no limit to pay imposed upon the borough forces, which is frequently raised to a higher standard than that allowed to counties under the rules sanctioned by the Secretary of State, both acting as a direct temptation to the constables to leave the county forces. Added to these causes, I find that the best men are often allured away, by the offer of higher wages than they receive in various occupations. Taking into consideration the immense importance of keeping good men in the service, and of obtaining recruits of a proper class, I do not hesitate to state that the time has arrived when the rule limiting the pay of the county constabulary requires consideration, as a point of vital consequence to the future efficiency of the force.

Having last year reported upon the advantages of breaking through the limits as to the numbers in each class, I have found in several counties the second class thrown open to all constables after a few months' service of a probationary character, and each year's experience convinces me the more that the chance of promotion should in no case be barred by the want of a vacancy in the upper class, but that for general or special good conduct every constable should have his chance of immediate promotion on the recommendation of the chief constable.

EXTRA DUTIES.

Inspectors of weights and measures.

The inspection of weights and measures is generally under the police in counties, and acts exceedingly well, both to the traders and the public; and I hear of very few instances of bad cases being brought before the magistrates in comparison with what took place a few years ago; there is, however, a difficulty about the scales, as they are only seizable under certain circumstances, whereas greater inequality and more mischief can be done by having the scales out of order than by the deficiency in the weights themselves.

Inspection of common lodging-houses.

The inspection of the common lodging-houses is generally under the police, and I always urge this appointment being given to tried and trustworthy officers, as a safeguard to the health of the public, and as giving a knowledge of who are passing and repassing through the district.

Inspectors of nuisances.

The appointment of inspectors of nuisances resting with the Boards of Guardians I find but rarely in the hands of the police; but I am satisfied that if they were so appointed, it would tend very much to the advantage of the inhabitants of every village, particularly in reference to sanitary measures, a question at the present moment peculiarly under the notice of the public. In order to get the appointment vested in the hands of the police, I should urge a requisition being sent, signed by the vestry, and forwarded to the Board of Guardians, stating it to be the wish of the parishioners that such appointment should be made, and on what terms as to remuneration for expenses incurred in this extra duty.

Relief of the casual poor.

The appointment of the police as assistant relieving officers for the casual poor continues to gain ground, but there are still a large number of Boards of Guardians who resist it. I have for many years continued to report the most satisfactory result arising from the police having these appointments, and I can furnish strong instances of its success, but yet much requires to be done, as in some cases there is a difficulty which is not easily overcome: I mean particularly where the workhouses are so far distant from each other, that vagrants cannot reach them in a day, and where lodging-houses are used instead of the workhouse tramp ward, and where there can be no task of work in the morning for the able-bodied, and no discipline to keep order during the night, which must be an unsatisfactory mode of administering indiscriminate relief. In the the eastern division of the county of Suffolk I found during my inspection a system

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a system adopted which I think it advisable here to mention as a very remarkable mode of testing the vagrants under such circumstances, and I could hear of no case of hardship reported.

In the Wickham Market Union.

Return showing the Number of Tramps relieved at the Saxmundham and Framlingham Police Stations in the Yoxford Division, embracing a Period of Three Years, ending 29th September 1865, under the Old and New System, and the Expense incurred.

STATIONS AND PERIODS.	OLD SYSTEM. Sending them to a Lodging House.		NEW SYSTEM. Giving Orders for the Union House, and sending them there by Conveyance.				
	Number Relieved.	Cost of Relief.	Number Received Orders for the Union House.	Number sent to Union House by Conveyance.	Number of Journeys to Union House.	Rate per Journey.	Amount.
Saxmundham:		£. s. d.					£. s. d.
Year ending 29 September 1863 to 29 January, a period of four months.	415	8 19 4	—	—	—	—	—
From 29 January to 29 September, a period of eight months.	–	- -	93	19	7	4 s.	1 8 –
Whole year, ending 29 September 1864.	–	- -	93	22	13	–	2 12 –
Whole year, ending 29 September 1865.	–	- -	84	16	8	–	1 12 –
			270	57	28	–	5 12 –
Framlingham:							
Year ending 29 September 1863 to 29 January, a period of 4 months.	102	2 11 –	—	—	—	—	—
From 29 January to 29 September, a period of eight months.	–	- -	59	57	17	–	4 7 –
Whole year, ending 29 September 1864.	–	- -	13	8	6	–	1 2 –
Whole year, ending 29 September 1865.	–	- -	16	10	4	–	1 1 –
	517	11 10 4	88	75	27	–	6 10 –

The contract for conveyance from Saxmundham to union house, Wickham Market, distance 8 miles, is, for each journey, 4 *s.* The same from Framlingham to union house, Wickham Market, distance 6½ miles, is, for one tramp, 3 *s.*; for two tramps, 5 *s.*; for three tramps, 6 *s.*

Relief to vagrants.

I beg to suggest that, when the distance between workhouse and workhouse is too great to be reached on an average day's tramp, tickets might be issued by the master of the workhouse to those leaving for a lodging-house on the main road, such lodging-house being under the supervision of a police constable, who would see the applicant on arrival and departure the next morning. As it is, however, I am satisfied if general rules were drawn out for this mode of relief, a great amount of good would arise from it to the destitute, as also to the public; and that with very little difficulty a system might be organised which would supervise the whole of the vagrant population, and benefit those who are really destitute and travelling for an honest purpose, at the same time acting so as to deter the professional mendicant. If I were not overstepping my duty as to the suppression of vagrancy, so intimately connected with crime, I would suggest some uniform regulation as to workhouse accommodation, classification, and discipline under the Poor Law Board, treating the destitute wayfarer with kindness, and the professional with stringent supervision.

The

Expense of extra duty.

The above extra duties imposed upon the force I believe to be of great benefit to the public, and I feel confident that the more useful the constabulary can be made in undertaking them, the more their services will be valued. The difficulty of remuneration, however, arises from the 10th section of the 2d & 3d Vict. c. 93, but as in the performance of these duties extra expenses must be incurred by the officers appointed to undertake them, it seems only just that they should be allowed, subject to the confirmation of the chief constable and Court of Quarter Sessions.

Before closing my report upon the county forces, I venture to suggest the advantage to be derived by admitting young men of the age of about 20 into the force, in preference to those of a greater age. I do so because I believe if a young man has mind and body to make an efficient constable, he will remain in the force as a profession for life, and become an invaluable officer; but, on the contrary, men of greater age have frequently damaged their constitution, and formed habits which are antagonistic to the life and discipline to which they find themselves subject when they enter the force, and consequently they remain but a short time, to the cost and injury of the public; added to which the question of age is of some importance to the superannuation fund.

BOROUGHS.

All the boroughs reported efficient in my last report continue to work well, but the same difficulty arises in obtaining recruits as in the counties. A great improvement has, however, taken place in breaking the limit of classes in almost all of the large boroughs, and where that has been done I find the constables remaining instead of seeking other employment. The authorities of the borough of Newcastle-under-Lyme have recently increased their force to an efficient number of constables, and as this is a very important borough, I have every reason to believe that the force will, on next inspection, obtain a certificate of efficiency. Three boroughs over 5,000 now only remain with weak inefficient forces, the boroughs of Bridgnorth, Louth, and the city of Oxford. In the city of Oxford it will become more important to unite the two forces of the University and the City under one head, in consequence of the increase in the population which must arise from the works of the Great Western Railway being about to be there located. Year by year I have advocated the consolidation of the two as the right step to be taken, and I am supported in this opinion on my inspection each year at Cambridge, where the consolidation appears to give general satisfaction.

The smaller boroughs under 5,000, with the exception of Banbury, Grantham, and Stratford-on-Avon, remain in the usual state of inefficiency from weakness in number and want of discipline.

Extra Duties.

Inspection of weights and measures, common lodging-houses, nuisances, and assistant relieving officers for vagrants.

The inspection of weights and measures, common lodging-houses, and nuisances are generally under the police, and in many cases the relief of vagrants, but there are some large boroughs having workhouses within their boundary still disinclined towards giving the police the appointment of assistant relieving officer for vagrants, which is not for the want of information upon the subject, as I invariably bring it before those authorities, whom I meet annually on my tour of inspection.

General Remarks.

As to assistance to be rendered by neighbouring forces on emergency.

During the year a general election has taken place, in which the constabulary have been peculiarly tried, and I am happy to report that generally I have found the delicate duty imposed upon them has been satisfactorily performed. At the same time, in some cases, remonstrances have been made as to the assistance required by small boroughs from county forces, which has been refused, and as it is entirely discretionary with the chief constable of the county when and where to assist (*see* 22 & 23 Vict. c. 32, s. 2), it appears desirable that some definition should be given as to the claim the small boroughs may consider they have upon county forces under cases of emergency. If these boroughs decline consolidation, and keep only a small number of constables, it

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it acts very unfairly upon the county to be called upon to lend their constables, neglecting their own duties, and at the risk of being personally damaged, and thereby placed upon the retiring allowance, perhaps for years, to be paid by the county. On the other hand, where large and important boroughs keep up a full and efficient force, and require assistance upon emergency, and where counties may require similar aid from such borough forces, I should venture to suggest the expediency of such co-operation as one of the most valuable points in the working of the whole system, believing that such reciprocity of action would add much to the good understanding so desirable between all forces.

Superannuation fund.

Having, in my last report, brought under your notice the critical state of the superannuation fund, and being aware that this question is under consideration, I merely repeat that in several counties I find the capital likely to be trenched upon if any more gratuities or pensions are granted, and that it is therefore of great importance that something should be done as speedily as practicable.

Ticket-of-Leave.

The new law relating to the supervision by the police of the ticket-of-leave men has now been in operation for a year, and from the information I have been able to collect from those in command of the police forces, both county and borough, within the district, I can report upon the whole the working of the Act has been successful. In the counties, in proportion to population, there are not so many cases as in boroughs, as the ticket-of-leave men on discharge appear to prefer going to towns; but both in counties and towns I find the police have given every assistance in their power to those who have reported themselves and obeyed the conditions of their license. There, however, appears a want of uniformity in the proceedings to be taken when these men break the conditions of their license, and no system is at present adopted as to the mode of action when such is the case. There is also a misunderstanding about the payment of expenses incurred in the apprehension of men who have left one county or borough, and been taken before the magistrates in another for re-committal. I should therefore venture to suggest that, in a subject of so deep an interest to the public, some central office should be established for communication between all local authorities as to the immediate mode of proceeding against those who have broken their condition of license, as it now frequently occurs that for want of active measures being at once taken these men avoid the punishment they deserve, by which they not only escape, but an encouragement is given to others to follow their example.

—	1. Ticket-of-Leave Men who came to County or Borough from Prison, and have regularly Reported themselves since 1 October 1864.	2. Ticket-of-Leave Men who Reported themselves on their arrival, and have changed their Residence under the Regulation.	3. Ticket-of-Leave Men who have failed in the Condition of their License.	4. Ticket-of-Leave Men who have been Re-committed during the time of Supervision since 1 October 1864.
COUNTIES - -	216	50	34	21
BOROUGHS - -	170	37	54	30
TOTAL - -	386	87	88	51

* *Note.*—Numbers under 1 and 2 are to their credit; Number 3, unknown; Number 4, clearly against them.

Appended are the tables of crime and detection as formerly drawn up; and however uninteresting they may appear, if correctly given by the heads of the constabulary, and authenticated by the local authorities, they ought to show the comparative amount of crime and of detection, and prove a most important return as to the efficiency of the police force. The table of licensed public and beer houses, with their misdoings, is also appended; but the loose system of licensing is so notorious, that the licenses revoked appear as if unworthy of notice. I find that the punishment of deprivation of license is very much mitigated

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mitigated by the power given to those who lose their license for selling spirits falling back without the slightest difficulty in obtaining a license to sell beer, and then still keeping a house open in defiance of the order in special sessions to deprive them of their license.

I think it right also to mention the difficulty under which the police act as regarding Sunday trading at alehouses and beer-houses, arising out of the law upon the subject.

The statutes 11 & 12 Vict. c. 49, and 18 & 19 Vict. c. 118, enact, that no licensed victualler nor beer-house keeper shall open his house for the sale of beer, nor sell it during certain hours on Sunday, Good Friday, and Christmas day, but are silent against allowing it to be drunk or consumed on the premises; were those words in these statutes, as they are in the original Beer Act (1 Will. 4), the difficulty would cease.

It appears that the beer-house law is equally defective on week days; the statute 3 & 4 Vict. c. 61, s. 15, having the words "not to be drunk on the premises," are not re-capitulated in the concluding part of the section.

I cannot do better than refer to the decision of the judges, and remarks upon the insufficiency of the law contained in Mr. Stone's excellent work, "The Justices' Manual," title, Alehouses and Beer-houses, namely: "It is a decision of the Court of Queen's Bench that beer may be sold and brought into a room at any time before the forbidden hour, and that the landlord is not compelled to turn out his guests, but justified in allowing them to drink and consume it during the time it is not lawful to sell it." Again, it may be given away, and is given away (no doubt covertly and evasively) during the forbidden hours, so that it is next to impossible for the police to prove the sale or keeping open for sale, which is a serious detriment to their services under this Act.

In conclusion, I have to report that both county and borough forces generally have progressed in efficiency during the year, and to add that on my inspection I derived great advantage from occasionally attending the courts, either at the assizes or quarter sessions, for the purpose of observing the manner in which cases were got up by the police, and how constables gave their evidence when under examination—a test of great value when inquiring into the character and working of a force, and practically one of more importance than the common routine of an annual inspection, in proving the efficiency of the force in their most responsible duties.

(signed) *William Cartwright*, Lieut. General,
Her Majesty's Inspector of Constabulary for
District No. 1.

Table I.

Group 1.—English Agricultural Counties.

A COMPARATIVE STATEMENT of the Strength of, and Numerical Changes in, the Police Forces; the Number of "Table 4, Indictable Offences" Committed; the Numbers and Per-Centages of Offenders Apprehended and Committed for Trial for such Offences; and the Number of Bad Characters, with their several Proportions to Population, Area, and Police, in the undermentioned English Agricultural Counties having efficient Police Forces, for the Year ending 29th September 1865.

COUNTIES (English Agricultural).	Population (Census 1861) and Area.	The Police Force.					Number of "Table 4, Indictable Offences" Committed.				Number of Offenders Apprehended and Committed for Trial for such Offences.		Number of known Thieves and Suspected Persons at large.		
1.	2.	Total Strength. 3.	Strength to 1,000 Population. 4.	Strength to 1,000 Acres. 5.	Total Number Resigned and Dismissed. 6.	Change per Cent. 7.	Total. 8.	To 1,000 Population. 9.	To 1,000 Acres. 10.	To each Unit of Police Strength. 11.	Total. 12.	Number Committed for Trial for each 100 Indictable Offences Committed. 13.	Total. 14.	To each Unit of Police Strength. 15.	To 1,000 Population. 16.
Bedfordshire - - -	Pop. 121,805 Area 281,211	85	·69	·30	14	16·47	109	·89	·38	1·28	80	73·39	459	5·40	3·76
Buckinghamshire - -	Pop. 160,022 Area 461,980	124	·77	·26	23	18·54	228	1·42	·49	1·83	130	57·01	733	5·91	4·58
Cambridgeshire - -	Pop. 85,256 Area 290,213	70	·82	·24	9	12·85	112	1·31	·38	1·60	74	66·07	263	3·75	3·08
Ely, Isle of - - -	Pop. 55,319 Area 221,029	52	·94	·23	7	13·46	53	·95	·23	1·01	43	81·13	331	6·36	5·98
Essex, with Harwich and Saffron Walden - -	Pop. 291,924 Area 984,633	256	·87	·26	12	4·68	357	1·22	·36	1·39	171	47·89	857	3·34	2·93
Hertfordshire - - -	Pop. 141,209 Area 368,810	92	·65	·24	2	2·17	199	1·40	·53	2·16	102	51·25	1,178	12·80	8·34
Huntingdonshire, with Godmanchester and Huntingdon - - - -	Pop. 64,250 Area 224,418	52	·80	·23	3	5·76	48	·74	·21	·92	36	75·00	154	2·96	2·39
Leicestershire - - -	Pop. 169,350 Area 510,204	103	·60	·20	15	14·56	174	1·02	·34	1·68	102	58·62	392	3·80	2·31
Lincolnshire - - -	Pop. 343,140 Area 1,742,329	268	·78	·15	52	19·40	414	1·20	·23	1·54	249	60·14	1,214	4·53	3·24
Norfolk, with Thetford -	Pop. 317,295 Area 1,333,440	222	·69	·16	11	4·95	269	·84	·20	1·21	215	79·92	1,295	5·83	4·08
Northamptonshire - -	Pop. 167,854 Area 575,763	110	·65	·19	23	20·90	243	1·44	·42	2·20	130	53·49	203	1·84	1·20
Peterborough Liberty -	Pop. 22,655 Area 51,695	18	·79	·34	3	16·66	47	2·07	·90	2·61	40	85·10	71	4·11	3·27
Oxfordshire - - -	Pop. 140,730 Area 469,935	95	·67	·20	10	10·52	109	·77	·23	1·14	80	73·39	544	5·72	3·86
Rutlandshire - - -	Pop. 21,867 Area 104,568	8	·36	·07	3	37·50	9	·41	·08	1·12	9	*100·00	37	4·62	1·69
Shropshire, with Oswestry and Wenlock - -	Pop. 217,379 Area 842,928	116	·53	·13	19	16·37	287	1·32	·34	2·17	214	74·56	355	3·06	1·63
Suffolk, East, with Beccles Eye, and Orford - -	Pop. 179,213 Area 589,212	114	·63	·19	11	9·64	146	·81	·24	1·28	88	60·27	312	2·73	1·74
Suffolk, West, with Bury St. Edmunds - -	Pop. 113,418 Area 353,213	89	·78	·25	9	10·11	136	1·19	·38	1·52	74	54·41	247	2·77	2·17
Averages - - -	- - -	-	·71	·19	-	12·05	-	1·12	·31	1·56	-	* 62·36	-	4·61	3·31

* More than one prisoner committed for one offence in two cases, and Rutlandshire is omitted from the average for that reason.

TABLE I.

GROUP 2.—MINING AND MANUFACTURING COUNTIES.

A COMPARATIVE STATEMENT of the Strength of, and Numerical Changes in, the Police Forces; the Number of "Table 4, Indictable Offences" Committed; the Numbers and Per-Centages of Offenders Apprehended and Committed for Trial for such Offences; and the Number of Bad Characters, with the several Proportions to Population, Area, and Police, in the undermentioned MINING and MANUFACTURING COUNTIES having efficient Police Forces, for the Year ending 29th September 1865.

COUNTIES (MINING AND MANUFACTURING).	Population (Census 1861) and Area.	The Police Force.					Number of "Table 4, Indictable Offences" Committed.				Number of Offenders Apprehended and Committed for Trial for such Offences.		Number of known Thieves and Suspected Persons at large.		
		Total Strength.	Strength to 1,000 Population.	Strength to 1,000 Acres.	Total Number Resigned and Dismissed.	Change per Cent.	Total.	To 1,000 Population.	To 1,000 Acres.	To each Unit of Police Strength.	Total.	Number Committed for Trial for each 100 Indictable Offences Committed.	Total.	To each Unit of Police Strength.	To 1,000 Population.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Derbyshire - - -	Pop. 286,400 Area 623,992	161	·56	·25	21	13·04	179	·62	·28	1·11	156	* 87·15	1,136	7·05	3·96
Nottinghamshire, with Retford - - - -	Pop. 207,691 Area 521,110	138	·66	·26	21	15·21	178	·85	·34	1·28	181	* 101·68	931	6·74	4·48
Staffordshire, with Stafford and Tamworth - -	Pop. 630,829 Area 706,463	421	·66	·59	63	14·96	937	1·48	1·32	2·22	551	58·80	2.225	5·28	3·52
Warwickshire - - -	Pop. 193,123 Area 546,665	171	·88	·31	37	21·63	285	1·47	·52	1·66	152	53·33	548	3·20	2·83
Worcestershire, with Evesham - - - -	Pop. 249,154 Area 431,553	176	·70	·40	27	15·34	440	1·76	1·01	2·50	264	60·00	699	3·97	2·80
Averages - - -	- - -	-	·68	·37	-	15·83	-	1·28	·71	1·89	-	† 58·18	-	5·19	3·53

TABLE I.

GROUP 3.—WELSH COUNTIES.

A COMPARATIVE STATEMENT of the Strength of, and Numerical Changes in, the Police Forces; the Number of "Table 4, Indictable Offences" Committed; the Numbers and Per-Centages of Offenders Apprehended and Committed for Trial for such Offences; and the Number of Bad Characters, with their several Proportions to Population, Area, and Police, in the undermentioned WELSH COUNTIES having efficient Police Forces, for the Year ending 29th September 1865.

COUNTIES (WELSH).	Population (Census 1861) and Area.	The Police Force.					Number of "Table 4, Indictable Offences" Committed.				Number of Offenders Apprehended and Committed for Trial for such Offences.		Number of known Thieves and Suspected Persons at large.		
		Total Strength.	Strength to 1,000 Population.	Strength to 1,000 Acres.	Total Number Resigned and Dismissed.	Change per Cent.	Total.	To 1,000 Population.	To 1,000 Acres.	To each Unit of Police Strength.	Total.	Number Committed for Trial for each 100 Indictable Offences Committed.	Total.	To each Unit of Police Strength.	To 1,000 Population.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Anglesea, with Beaumaris -	Pop. 54,609 Area 193,453	23	·41	·11	3	13·04	56	1·02	·28	2·43	49	87·50	60	2·60	1·09
Carnarvonshire, with Carnarvon and Bangor -	Pop. 92,776 Area 367,995	55	·59	·14	14	25·45	103	1·11	·27	1·87	25	24·27	192	3·49	2·00
Denbighshire, with Denbigh	Pop. 104,316 Area 374,303	57	.54	·15	6	10·52	87	·83	·25	1·52	71	81·60	100	1·75	·95
Flintshire, with Flint -	Pop. 69,849 Area 185,264	37	·53	·19	6	16·21	67	·95	·36	1·81	44	65·67	123	3·32	1·76
Merionethshire - - -	Pop. 38,888 Area 383,581	24	·61	·06	3	12·50	37	·95	·09	1·54	34	91·89	50	2·08	1·28
Montgomeryshire, with Montgomery and Welchpool -	Pop. 66,919 Area 483,323	31	·46	·06	1	3·22	138	2·06	·28	4·45	86	62·31	173	5·58	2·58
Averages - - -	- - -	-	·53	·11	-	14·53	-	1·14	·24	2·14	-	63·31	-	3·07	1·63

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* Several prisoners committed for one offence.

† Derbyshire and Notts omitted from this average, each county having had several prisoners committed for single offences.

TABLE I.

GROUP 4.—BOROUGHS with Populations under 8,000.

A COMPARATIVE STATEMENT of the Strength of, and Numerical Changes in, the Police Forces; the Number of "Table 4, Indictable Offences" Committed; the Numbers and Per-Centages of Offenders Apprehended and Committed for Trial for such Offences; and the Number of Bad Characters, with their several Proportions to Population and Police in the undermentioned BOROUGHS, with Populations under 8,000, having efficient Police Forces, for the Year ending 29th September 1865.

BOROUGHS, with Populations under 8,000. 1.	Population (Census 1861). 2.	The Police Force.				Number of "Table 4, Indictable Offences" Committed.			Number of Offenders Apprehended and Committed for Trial for such Offences.		Number of known Thieves and Suspected Persons at large.		
		Total Strength. 3.	Strength to 1,000 Population. 4.	Total Number Resigned and Dismissed. 5.	Change per Cent. 6.	Total. 7.	To 1,000 Population. 8.	To each Unit of Police Strength. 9.	Total. 10.	Number Committed for Trial for each 100 Indictable Offences Committed. 11.	Total. 12.	To each Unit of Police Strength. 13.	To 1,000 Population. 14.
Banbury - - - -	4,055	5	1·25	1	20·00	7	1·75	1·40	6	85·71	4	·80	1·00
Grantham - - -	4,954	5	1·02	2	40·00	32	6·53	6·40	26	81·25	15	3·00	3·06
Hertford - - - -	6,769	6	·89	–	None -	9	1·34	1·50	5	55·55	68	11·33	10·14
Lichfield - - - -	6,893	6	·88	2	33·33	8	1·17	1·33	3	37·50	16	2·66	2·35
Ludlow . - - -	5,178	5	·98	2	40·00	8	1·56	1·60	6	75·00	10	2·00	1·96
St. Alban's - - -	7,675	7	·92	–	None -	24	3·15	3·42	12	50·00	15	2·14	1·97
Stratford-on-Avon - -	3,672	4	1·11	1	25·00	2	·55	·50	2	100·00	13	3·25	3·61
Sudbury - - - -	6,879	6	·88	–	- -	12	1·76	2·00	8	66·66	23	3·83	3·38
Averages - - - -	- -	–	·95	–	18·18	–	*1·37	* 1·43	- -	*65·20	- -	3·72	3·56

TABLE I.

GROUP 5.—BOROUGHS with Populations exceeding 8,000 and under 20,000.

A COMPARATIVE STATEMENT of the Strength of, and Numerical Changes in, the Police Forces; the Number of "Table 4, Indictable Offences" Committed; the Numbers and Per-Centages of Offenders Apprehended and Committed for Trial for such Offences; and the Number of Bad Characters, with their several Proportions to Population and Police in the undermentioned BOROUGHS, with Populations exceeding 8,000 and not exceeding 20,000, having efficient Police Forces, for the Year ending 29th September 1865.

BOROUGHS with Populations exceeding 8,000 and not exceeding 20,000. 1.	Population (Census 1861). 2.	The Police Force.				Number of "Table 4, Indictable Offences" Committed.			Number of Offenders Apprehended and Committed for Trial for such Offences.		Number of known Thieves and Suspected Persons at large.		
		Total Strength. 3.	Strength to 1,000 Population. 4.	Total Number Resigned and Dismissed. 5.	Change per Cent. 6.	Total. 7.	To 1,000 Population. 8.	To each Unit of Police Strength. 9.	Total. 10.	Number Committed for Trial for each 100 Indictable Offences Committed. 11.	Total. 12.	To each Unit of Police Strength. 13.	To 1,000 Population. 14.
Bedford - - - -	13,412	13	·97	–	None -	29	2·16	2·23	12	41·37	20	1·53	1·49
Boston - - - -	15,038	15	1·00	–	None -	30	2·00	2·00	26	86·66	28	1·86	1·86
Chesterfield - - -	9,835	11	1·12	2	18·18	56	5·71	5·09	33	58·92	24	2·18	2·44
Great Grimsby - -	11,032	10	·90	2	20·00	46	4·18	4·60	22	47·82	37	3·70	3·36
Kidderminster - - -	15,399	16	1·04	1	6·25	27	1·76	1·68	16	59·25	43	2·68	2·81
King's Lynn - - -	15,981	18	1·13	–	none	14	·88	·77	9	64·28	5	·27	·31
Leamington - - -	17,452	21	1·20	2	9·52	21	1·20	1·00	14	66·66	50	2·38	2·87
Newark - - - -	11,562	11	·95	1	9·09	11	·95	1·00	9	81·81	10	·90	·86
Stamford - - - -	8,044	10	1·25	1	10·00	22	2·75	2·20	12	54·54	19	1·90	2·37
Warwick - - - -	10,589	11	1·04	2	18·18	25	2·38	2·27	14	56·00	11	1·00	1·04
Wisbeach - - - -	9,218	11	1·19	1	9·09	12	1·30	1·09	8	66·66	51	4·63	5·54
Averages - - -	- -	–	1·06	–	8·16	-	2·13	1·99	–	59·72	- -	2·02	2·16

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* Grantham and St. Alban's omitted from this average because of the exceptionally high rate of "Crime committed."

TABLE I.

GROUP 6.—BOROUGHS with Populations exceeding 20,000 and under 50,000.

A COMPARATIVE STATEMENT of the Strength of, and Numerical Changes in, the Police Forces; the Number of "Table 4, Indictable Offences" Committed; the Numbers and Per-Centages of Offenders Apprehended and Committed for Trial for such Offences; and the Number of Bad Characters, with their several Proportions to Population and Police in the undermentioned BOROUGHS, with Populations exceeding 20,000 and not exceeding 50,000, having efficient Police Forces, for the Year ending 29th September 1865.

BOROUGHS with Populations exceeding 20,000 and not exceeding 50,000.	Population (Census 1861).	The Police Force.				Number of "Table 4, Indictable Offences" Committed.			Number of Offenders Apprehended and Committed for Trial for such Offences.		Number of known Thieves and Suspected Persons at large.		
		Total Strength.	Strength to 1,000 Population.	Total Number Resigned and Dismissed.	Change per Cent.	Total.	To 1,000 Population.	To each Unit of Police Strength.	Total.	Number Committed for Trial for each 100 Indictable Offences Committed.	Total.	To each Unit of Police Strength.	To 1,000 Population.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
Cambridge - - -	26,351	34	1·29	3	8·82	39	1·48	1·14	23	58·97	102	3·00	3·87
Colchester - - -	23,730	22	·92	1	4·54	85	3·58	3·86	35	41·17	91	4·13	3·83
Coventry - - -	40,937	37	·90	5	13·51	58	1·41	1·56	39	67·24	56	1·51	1·36
Derby - - - -	43,081	43	1·00	7	16·27	51	1·18	1·18	29	56·86	128	2·97	2·97
Great Yarmouth - -	34,573	34	·98	1	2·94	62	1·79	1·82	36	58·06	102	3·00	2·95
Ipswich - - -	37,719	37	·98	12	32·43	105	2·78	2·83	33	31·42	52	1·40	1·37
Lincoln - - -	20,995	21	1·00	3	14·28	21	1·00	1·00	22	*104·76	33	1·57	1·57
Northampton - -	32,813	39	1·18	10	25·64	97	2·95	2·48	52	53·60	73	1·87	2·22
Shrewsbury - - -	23,000	23	1·00	5	21·73	42	1·82	1·82	21	50·00	37	1·60	1·60
Walsall - - -	37,762	30	·79	10	33·33	68	1·80	2·26	32	47·05	206	6·86	5·46
Worcester - - -	32,000	33	1·03	7	21·21	125	3·90	3·78	77	61·60	134	4·06	4·18
Averages - - -	- -	–	1·00	–	18·13	–	2 13	2·13	–	† 51·50	–	2·87	2·87

TABLE I.

GROUP 7.—BOROUGHS with Populations exceeding 50,000.

A COMPARATIVE STATEMENT of the Strength of, and Numerical Changes in, the Police Forces; the Number of "Table 4, Indictable Offences" Committed; the Numbers and Per-Centages of Offenders Apprehended and Committed for Trial for such Offences; and the Number of Bad Characters, with their several Proportions to Population and Police in the undermentioned BOROUGHS, with Populations exceeding 50,000, having efficient Police Forces, for the Year ending 29th September 1865.

BOROUGHS with Populations exceeding 50,000.	Population (Census 1861).	The Police Force.				Number of "Table 4, Indictable Offences" Committed.			Number of Offenders Apprehended and Committed for Trial for such Offences.		Number of known Thieves and Suspected Persons at large.		
		Total Strength.	Strength to 1,000 Population.	Total Number Resigned and Dismissed.	Change per Cent.	Total.	To 1,000 Population.	To each Unit of Police Strength.	Total.	Number Committed for Trial for each 100 Indictable Offences Committed.	Total.	To each Unit of Police Strength.	To 1,000 Population.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
Birmingham - - -	295,955	377	1·27	115	30·50	1,258	4·25	3·33	436	34·65	1,503	3·98	5·07
Leicester - - -	68,168	77	1·13	19	24·67	202	2·96	2·62	77	38·11	144	1·87	2·11
Norwich - - -	74,414	91	1·22	9	9·89	154	2·06	1·69	91	59·09	202	2·21	2·71
Nottingham - - -	74,531	100	1·34	19	19·00	350	4·71	3·50	58	16·57	214	2·14	2·87
Wolverhampton - -	60,858	68	1·11	24	35·29	157	2·58	2·30	123	78·34	446	6·55	7·33
Averages ‡ - - -	- -	–	‡1·20	–	‡21·13	–	‡3·10	‡2·56	–	‡40·44	–	‡2·99	‡3·62

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* More than one prisoner committed for one offence in several cases.

† Lincoln City is omitted from this average, having had several prisoners committed for single offences.

‡ Birmingham is excluded from these averages.

TABLE II.

GROUP 1.—ENGLISH AGRICULTURAL COUNTIES.

A STATISTICAL TABLE of the Numbers of Public Houses and Beer Houses, the Number proceeded against and Convicted of Offences against good Order, and the Number of Persons proceeded against, Convicted, and Discharged for Drunkenness, with their Proportions to each other, and to Population; Showing also their Comparative Influence upon the Amount of Indictable Crime Committed, and the Number of known Thieves, &c., existing in the undermentioned ENGLISH AGRICULTURAL COUNTIES, for the Year ending 29th September 1865.

COUNTIES (ENGLISH AGRICULTURAL).	Population (Census 1861).	Number of "Table 4," or Indictable Offences Committed, per 1,000 Population.	Number of known Thieves, &c., to 1,000 Population.	LICENSED HOUSES.												DRUNK AND DISORDERLIES.							
				Total Number of Licensed Houses.		Total Number proceeded against for Offences against good Order.		Total Number Convicted.		Total Number of Licenses forfeited for Misconduct.	To 1,000 Population.	Number per Cent. proceeded against.	Number per Cent. Convicted of Offences against good Order.	Number per Cent. whose Licenses were forfeited for Misconduct.	Number per Cent. of Informations against Licensed Houses Dismissed.	Total Number proceeded against.	Total Number Convicted.	Total Number Discharged.	Number proceeded against per 1,000 Population.	Number Convicted per 1,000 Population.	Number per Cent. proceeded against who were Discharged.	Number Convicted to each Licensed House.	Number Convicted to each Conviction of a Licensed House.
				Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.													
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
Bedfordshire - - -	121,805	·89	3·76	543	390	9	17	5	14	none	7·66	2·78	2·03	none	26·92	250	224	26	2·05	1·83	10·40	·24	11·78
Buckinghamshire - -	160,022	1·42	4·58	781	551	31	33	24	27	none	8·32	4·80	3·82	none	20·31	446	359	87	2·78	2·24	19·50	·26	7·03
Cambridgeshire - -	85,256	1·31	3·08	405	334	3	13	3	12	2	8·67	2·16	2·02	·27	6·25	69	62	7	·80	·72	10·14	·08	4·13
Ely, Isle of - - -	55,319	·95	5·98	256	303	14	10	12	9	none	10·10	4·29	3·75	none	12·50	142	127	15	2·56	2·29	10·56	·22	6·04
Essex, with Harwich and Saffron Walden -	291,924	1·22	2·93	996	820	18	16	16	13	1	6·22	1·87	1·59	·05	14·70	246	209	37	·84	·71	15·00	·11	7·20
Hertfordshire - - -	141,209	1·40	8·34	705	629	15	26	12	23	none	9·44	3·07	2·62	none	14·63	304	232	72	2·15	1·64	23·68	·17	6·62
Huntingdonshire, with Godmanchester and Huntingdon - - -	64,250	·74	2·39	312	320	2	3	2	2	none	9·84	·79	·63	none	20·00	87	56	31	1·35	·87	35·63	·08	14·00
Leicestershire - - -	169,356	1·02	2·31	767	218	10	14	9	12	2	5·81	2·43	2·13	·20	12·50	255	223	32	1·50	1·31	12·54	·22	10·61
Lincolnshire - - -	343,140	1·20	3·24	1,079	607	57	44	36	36	5	4·91	5·99	4·27	·29	28·71	1,095	996	99	3·19	2·90	9·04	·59	13·83
Norfolk, with Thetford -	317,295	·84	4·08	1,240	545	25	31	22	28	3	5·62	3·13	2·80	·16	10·71	370	354	16	1·16	1·11	4·32	·19	7·08
Northamptonshire - -	167,854	1·44	1·20	623	379	10	10	9	8	1	5·97	1·99	1·69	·09	15·00	303	257	46	1·80	1·53	15·18	·25	15·11
Oxfordshire - - -	140,730	·77	3·86	592	402	20	20	14	12	none	7·06	4·02	2·61	none	35·00	251	185	66	1·78	1·31	26·29	·18	7·11
Peterborough Liberty -	22,655	2·07	3·27	95	79	1	3	1	2	none	7·69	2·29	1·72	none	25·00	22	21	1	·97	·92	4·54	·12	7·00
Rutlandshire - - -	21,867	·41	1·69	78	68	2	5	2	3	none	6·69	4·79	3·42	none	28·57	33	28	5	1·51	1·28	15·15	·19	5·60
Shropshire, with Oswestry and Wenlock - -	217,379	1·32	1·63	726	426	31	39	18	31	1	5·30	6·07	4·25	·08	30·00	1,374	1,216	158	6·32	5·59	11·49	1·05	24·81
Suffolk, East, with Beccles, Eye, and Orford - -	179,213	·81	1·74	490	216	5	14	4	13	1	3·93	2·69	2·40	·14	10·52	196	160	36	1·09	·89	18·36	·22	9·41
Suffolk, West, with Bury St. Edmund's - -	113,418	1·19	2·17	337	247	6	14	5	10	none	5·14	3·44	2·56	none	25·00	185	165	20	1·63	1·45	10·81	·28	11·00
Averages - - -	- -	- -	–	–	–	- -	- -	–	–	- -	6·33	3·44	2·71	·09	21·34	–	–	–	2·15	1·86	13·39	·29	10·85

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

TABLE II.

GROUP 2.—MINING AND MANUFACTURING COUNTIES.

A STATISTICAL TABLE of the Numbers of Public Houses and Beer Houses, the Number proceeded against and Convicted of Offences against good Order, and the Number of Persons proceeded against, Convicted, and Discharged for Drunkenness, with their Proportions to each other and to Population; Showing also their Comparative Influence upon the Amount of Indictable Crime Committed, and the Number of known Thieves, &c., existing in the undermentioned MINING and MANUFACTURING COUNTIES, for the Year ending 29th September 1865.

COUNTIES (MINING AND MANUFACTURING).	Population (Census 1861).	Number of "Table 4," or Indictable Offences Committed, per 1,000 Population.	Number of known Thieves, &c., to 1,000 Population.	LICENSED HOUSES.												DRUNK AND DISORDERLIES.							
				Total Number of Licensed Houses.		Total Number proceeded against for Offences against good Order.		Total Number Convicted.		Total Number of Licenses forfeited for Misconduct.	To 1,000 Population.	Number per Cent. Proceeded against.	Number Per Cent. Convicted of Offences against good Order.	Number per Cent. whose Licenses were forfeited for Misconduct.	Number per Cent. of Informations against Licensed Houses Dismissed.	Total Number Proceeded against.	Total Number Convicted.	Total Number Discharged.	Number Proceeded against per 1,000 Population.	Number Convicted per 1,000 Population.	Number per Cent. Proceeded against who were Discharged.	Number Convicted to each Licensed House.	Number Convicted to each Conviction of a Licensed House.
				Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.													
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
Derbyshire - - -	286,400	·62	3·96	1,164	674	22	47	18	42	* 4	6·41	3·75	3·26	·21	13·04	803	693	110	2·80	2·41	13·69	·37	11·55
Nottinghamshire, with Retford - - -	207,691	·85	4·48	752	276	38	50	23	35	3	4·95	8·56	5·64	·29	34·09	641	500	141	3·08	2·40	21·99	·48	8·02
Staffordshire, with Stafford and Tamworth - -	630,829	1·48	3·52	2,036	2,254	130	416	103	368	4	6·80	12·72	10·97	·09	13·73	2,714	2,106	608	4·30	3·33	22·40	·49	4·47
Warwickshire - - -	193,123	1·47	2·83	780	338	18	36	18	34	7	5·78	4·83	4·65	·62	3·70	408	356	52	2·11	1·84	12·7	·31	6·84
Worcestershire, with Evesham - - - -	249,154	1·76	2·80	1,013	596	49	61	31	48	1	6·45	6·83	4·90	·06	28·18	522	426	96	2·09	1·71	18·39	·26	5·39
Averages - - -	-	-	-	-	-	-	-	-	-	-	6·30	8·77	7·28	·19	16·96	-	-	-	3·24	2·60	19·79	·41	5·66

* Including beer house deprived of license.

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

TABLE II.

GROUP 3.—WELSH COUNTIES.

A STATISTICAL TABLE of the Numbers of Public Houses and Beer Houses, the Number proceeded against and Convicted of Offences against good Order, and the Number of Persons proceeded against, Convicted and Discharged for Drunkenness, with their Proportions to each other and to Population; Showing also their Comparative Influence upon the Amount of Indictable Crime Committed, and the Number of known Thieves, &c. existing in the undermentioned WELSH COUNTIES, for the Year ending 29th September 1865.

WELSH COUNTIES. 1.	Population (Census 1861). 2.	Number of "Table 4," or Indictable Offences Committed per 1,000 Population. 3.	Number of known Thieves, &c. to 1,000 Population. 4.	LICENSED HOUSES.												DRUNK AND DISORDERLIES.							
				Total Number of Licensed Houses.		Total Number proceeded against for Offences against good Order.		Total Number Convicted.		Total Number of Licenses forfeited for Misconduct.	To 1,000 Population. 12.	Number per Cent. proceeded against. 13.	Number per Cent. Convicted of Offences against good Order. 14.	Number per Cent. whose Licenses were forfeited for Misconduct. 15.	Number per Cent. of Informations against Licensed Houses Dismissed. 16.	Total Number proceeded against. 17.	Total Number Convicted. 18.	Total Number Discharged. 19.	Number proceeded against per 1,000 Population. 20.	Number Convicted per 1,000 Population. 21.	Number per Cent. proceeded against who were Discharged. 22.	Number Convicted to each Licensed House. 23.	Number Convicted to each Conviction of a Licensed House. 24.
				Public Houses. 5.	Beer Houses. 6.	Public Houses. 7.	Beer Houses. 8.	Public Houses. 9.	Beer Houses. 10.	Public Houses. 11.													
Anglesea, with Beaumaris	54,609	1·02	1·09	271	13	6	1	6	1	none	5·20	2·46	2·46	none	none	60	24	36	1·09	·43	60·00	·08	3·42
Carnarvonshire, with Bangor and Carnarvon -	92,776	1·11	2·00	455	47	25	20	21	15	none	5·41	8·96	7·17	none	20·00	579	503	76	6·24	5·42	13·12	1·00	13·97
Denbighshire, with Denbigh	104,316	·83	·95	444	100	10	18	9	14	2	5·21	5·14	4·22	·36	17·85	400	300	100	3·83	2·87	25·00	·55	13·04
Flintshire, with Flint -	69,849	·95	1·76	421	61	25	20	20	19	2	6·90	9·33	8·09	·41	13·33	550	517	33	7·86	7·40	6·00	1·07	13·25
Merionethshire - -	38,888	·95	1·28	146	9	5	4	4	3	none	3·99	5·80	4·51	none	22·22	138	122	16	3·55	3·14	11·59	·78	17·42
Montgomeryshire, with Montgomery and Welchpool - - - -	66,919	2·06	2·58	257	56	12	6	12	6	2	4·67	5·75	5·75	·63	none	293	218	75	4·37	3·25	25·59	·69	12·11
Averages - - -	- -	- -	-	-	-	- -	- -	-	-	- -	5·33	6·66	5·70	·26	14·47	-	-	-	4·72	3·94	16·63	·73	12·95

TABLE II.

GROUP 4.—BOROUGHS, with Populations not exceeding 8,000.

A STATISTICAL TABLE of the Numbers of Public Houses and Beer Houses, the Number proceeded against and Convicted of Offences against good Order, and the Number of Persons proceeded against, Convicted, and Discharged for Drunkenness, with their Proportions to each other, and to Population; Showing also their Comparative Influence upon the Amount of Indictable Crime Committed, and the Number of known Thieves, &c., existing in the undermentioned BOROUGHS, with Populations not exceeding 8,000, for the Year ending 29th September 1865.

BOROUGHS, with Populations not exceeding 8,000.	Population (Census 1861).	Number of "Table 4," or Indictable Offences Committed per 1,000 Population.	Number of known Thieves, &c., to 1,000 Population.	LICENSED HOUSES.												DRUNK AND DISORDERLIES.							
				Total Number of Licensed Houses.		Total Number proceeded against for Offences against good Order.		Total Number Convicted.		Total Number of Licenses forfeited for Misconduct.	To 1,000 Population.	Number per Cent. proceeded against.	Number per Cent. Convicted of Offences against good Order.	Number per Cent. whose Licenses were forfeited for Misconduct.	Number per Cent. of Informations against Licensed Houses Dismissed.	Total Number proceeded against.	Total Number Convicted.	Total Number Discharged.	Number proceeded against per 1,000 Population.	Number Convicted per 1,000 Population.	Number per Cent. proceeded against who were Discharged.	Number Convicted to each Licensed House.	Number Convicted to each Conviction of a Licensed House.
				Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.													
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
Banbury - - - -	4,055	1·75	1·00	38	19	none	none	none	none	none	14·25	none	none	none	*	46	32	14	11·50	8·00	30·43	·56	†
Grantham - - -	4,954	6·53	3·06	33	17	1	1	1	none	none	10·20	4·00	2·00	none	50·00	68	57	11	13·87	11·63	16·17	1·14	57·00
Hertford - - - -	6,769	1·34	10·14	49	22	1	1	none	1	none	10·59	2·81	1·40	none	50·00	30	23	7	4·47	3·43	23·33	·32	23·00
Lichfield - - - -	6,893	1·17	2·35	66	4	3	none	2	none	none	10·29	4·28	2·85	none	33·33	92	81	11	13·52	11·91	11·95	1·15	40·50
Ludlow - - - -	5,178	1·56	1·96	59	4	3	none	3	none	none	12·35	4·76	4·76	none	none	75	52	23	14·70	10·19	30·66	·82	17·33
St. Alban's - - -	7,675	3·15	1·97	56	23	3	1	3	1	none	10·39	5·06	5·06	none	none	63	27	36	8·28	3·55	57·14	·34	6·75
Stratford-on-Avon - -	3,672	·55	3·61	34	4	1	none	1	none	none	10·55	2·63	2·63	none	none	17	12	5	4·72	3·33	29·41	·31	12·00
Sudbury - - - -	6,879	1·76	3·38	19	20	none	none	none	none	none	5·73	none	none	none	*	9	4	5	1·32	·58	55·55	·10	†
Averages - - -	- -	- -	-	-	-	- -	- -	-	-	- -	10·15	3·21	2·56	- -	20·00	-	-	-	8·69	6·26	28·00	·61	24·00

* No information laid against a licensed house.

† No licensed house convicted.

TABLE II.

GROUP 5.—BOROUGHS with Populations exceeding 8,000, and not exceeding 20,000.

A STATISTICAL TABLE of the Numbers of Public Houses and Beer Houses; the Number proceeded against and Convicted of Offences against good Order, and the Number of Persons proceeded against, Convicted and Discharged for Drunkenness, with their Proportions to each other and to Population; Showing also their Comparative Influence upon the Amount of Indictable Crime Committed, and the Number of known Thieves, &c., existing in the undermentioned BOROUGHS, with Populations exceeding 8,000, and not exceeding 20,000, for the Year ending 29th September 1865.

BOROUGHS, with Populations exceeding 8,000, and not exceeding 20,000. 1.	Population (Census 1861). 2.	Number of "Table 4," or Indictable Offences Committed per 1,000 Population. 3.	Number of known Thieves, &c., to 1,000 Population. 4.	LICENSED HOUSES.												DRUNK AND DISORDERLIES.							
				Total Number of Licensed Houses.		Total Number proceeded against for Offences against good Order.		Total Number Convicted.		Total Number of Licenses forfeited for Misconduct.													
				Public Houses. 5.	Beer Houses. 6.	Public Houses. 7.	Beer Houses. 8.	Public Houses. 9.	Beer Houses. 10.	Public Houses. 11.	To 1,000 Population. 12.	Number per Cent. proceeded against. 13.	Number per Cent. Convicted of Offences against good Order. 14.	Number per Cent. whose Licenses were forfeited for Misconduct. 15.	Number per Cent. of Informations against Licensed Houses Dismissed. 16.	Total Number proceeded against. 17.	Total Number Convicted. 18.	Total Number Discharged. 19.	Number proceeded against per 1,000 Population. 20.	Number Convicted per 1,000 Population. 21.	Number per Cent. proceeded against who were Discharged. 22.	Number Convicted to each Licensed House. 23.	Number Convicted to each Conviction of a Licensed House. 24.
Bedford - - - -	13,412	2·16	1·49	45	65	1	1	none	1	none	8·20	1·81	·90	none	50·00	48	18	30	3·58	1·34	62·50	·16	18·00
Boston - - - -	15,038	2·00	1·86	46	44	6	11	6	11	none	6·00	18·88	18·88	none	none	126	86	40	8·40	5·73	31·74	·95	5·05
Chesterfield - - -	9,835	5·71	2·44	59	38	4	6	4	5	none	9·89	10·30	9·27	none	10·00	104	66	38	10·61	6·73	36·53	·68	7·33
Great Grimsby - -	11,032	4·18	3·36	34	33	5	2	3	2	none	6·09	10·44	7·46	none	28·57	100	84	16	9·09	7·63	16·00	1·25	16·80
Kidderminster - -	15,399	1·76	2·81	93	25	3	none	3	none	none	7·66	2·54	2·54	none	none	59	27	32	3·83	1·75	54·23	·22	9·00
King's Lynn - - -	15,981	·88	·31	155	9	4	none	4	none	none	10·31	2·43	2·43	none	none	98	77	21	6·16	4·84	21·42	·46	19·25
Leamington - - -	17,452	1·20	2·87	82	7	5	3	5	3	none	5·11	8·98	8·98	none	none	49	44	5	2·81	2·52	10·20	·49	5·50
Newark - - - -	11,562	·95	·86	55	29	4	1	4	1	none	7·34	5·95	5·95	none	none	25	21	4	2·17	1·82	16·00	·25	4·20
Stamford - - -	8,044	2·75	2·37	68	8	1	none	none	none	1	9·50	1·31	none	1·31	100·00	81	16	65	10·12	2·00	80·24	·21	*
Warwick - - - -	10,589	2·38	1·04	63	12	2	1	none	1	none	7·14	4·00	1·33	none	66·66	68	21	47	6·47	2·00	69·11	·28	21·00
Wisbeach - - -	9,218	1·30	5·54	48	30	2	2	2	1	1	8·47	5·12	3·84	1·28	25·00	70	34	36	7·60	3·69	51·42	·43	11·33
Averages - - -	-	-	-	-	-	-	-	-	-	-	7·62	6·10	5·34	·19	12·50	-	-	-	6·02	3·59	40·33	·47	8·82

* No licensed house convicted.

TABLE II.

GROUP 6.—BOROUGHS, with Populations exceeding 20,000, and not exceeding 50,000.

A STATISTICAL TABLE of the Numbers of Public Houses and Beer Houses, the Number proceeded against and Convicted of Offences against good Order, and the Number of Persons proceeded against, Convicted, and Discharged for Drunkenness, with their Proportions to each other and to Population; Showing also their Comparative Influence upon the Amount of Indictable Crime Committed, and the Number of known Thieves, &c. existing in the undermentioned BOROUGHS, with Populations exceeding 20,000, and not exceeding 50,000, for the Year ending 29th September 1865.

BOROUGHS, with Populations exceeding 20,000, and not exceeding 50,000.	Population (Census 1861).	Number of "Table 4," or Indictable Offences Committed per 1,000 Population.	Number of known Thieves, &c. to 1,000 Population.	LICENSED HOUSES.												DRUNK AND DISORDERLIES.							
				Total Number of Licensed Houses.		Total Number proceeded against for Offences against good Order.		Total Number Convicted.		Total Number of Licenses forfeited for Misconduct.													
				Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.	To 1,000 Population.	Number per Cent. proceeded against.	Number per Cent. Convicted of Offences against good Order.	Number per Cent. whose Licenses were forfeited for Misconduct.	Number per Cent. of Informations against Licensed Houses Dismissed.	Total Number proceeded against.	Total Number Convicted.	Total Number Discharged.	Number proceeded against per 1,000 Population.	Number Convicted per 1,000 Population.	Number per Cent. proceeded against who were Discharged.	Number Convicted to each Licensed House.	Number Convicted to each Conviction of a Licensed House.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
Cambridge - - -	26,351	1·48	3·87	217	40	5	6	5	6	none	9·77	4·28	4·28	none	none	104	49	55	3·95	1·86	52·88	·19	4·45
Colchester - - -	23,730	3·58	3·83	108	38	none	2	none	2	none	6·16	1·36	1·36	none	none	67	33	34	2·82	1·39	50·74	·22	16·50
Coventry - - -	40,937	1·41	1·36	251	1	8	none	7	none	none	6·16	3·17	2·77	none	12·50	167	41	126	4·08	1·00	75·44	·16	5·85
Derby - - - -	43,081	1·18	2·97	209	111	20	12	15	8	none	7·44	10·00	7·18	none	28·12	340	139	201	7·90	3·23	59·11	·43	6·04
Great Yarmouth - -	34,573	1·79	2·95	182	85	14	14	9	10	none	7·73	10·48	7·11	none	32·14	201	187	14	5·82	5·42	6·96	·70	9·84
Ipswich - - - -	37,719	2·78	1·37	139	134	2	5	2	2	none	7·77	2·38	1·36	none	42·85	64	11	53	1·69	·29	82·81	·03	2·75
Lincoln (City) - -	20,995	1·00	1·57	107	42	none	6	none	5	none	7·12	4·02	3·35	none	16·66	88	51	37	4·21	2·44	42·04	·34	10·20
Northampton - - -	32,813	2·95	2·22	70	201	9	51	8	43	none	8·26	22·14	18·81	none	15·00	147	146	1	4·48	4·45	·68	·53	2·86
Shrewsbury - - -	23,000	1·82	1·60	157	28	10	3	7	2	none	8·04	7·02	4·86	none	30·76	207	152	55	9·00	6·60	26·57	·82	16·88
Walsall - - - -	37,762	1·80	5·46	174	126	24	17	15	15	none	7·95	13·66	10·00	none	26·82	131	84	47	3·47	2·22	35·87	·28	2·80
Worcester - - -	32,000	3·90	4·18	178	98	19	9	9	8	none	8·62	10·14	6·15	none	39·28	268	127	141	8·37	3·96	52·61	·46	7·47
Averages - - -	- -	- -	-	-	-	- -	- -	-	-	- -	7·63	8·75	6·60	- -	24·57	-	-	-	5·05	2·89	42·82	·37	5·73

TABLE II.

GROUP 7.—BOROUGHS, with Populations exceeding 50,000.

A STATISTICAL TABLE of the Numbers of Public Houses and Beer Houses, the Number proceeded against and Convicted of Offences against good Order, and the Number of Persons proceeded against, Convicted, and Discharged for Drunkenness, with their Proportions to each other, and to Population; Showing also their Comparative Influence upon the Amount of Indictable Crime Committed, and the Number of known Thieves, &c., existing in the undermentioned BOROUGHS, with Populations exceeding 50,000, for the Year ending 29th September 1865.

BOROUGHS, with Populations exceeding 50,000.	Population (Census 1861).	Number of "Table 4" or Indictable Offences, Committed per 1,000 Population.	Number of known Thieves, &c., per 1,000 Population.	LICENSED HOUSES.												DRUNK AND DISORDERLIES.							
				Total Number of Licensed Houses.		Total Number proceeded against for Offences against good Order.		Total Number Convicted.		Total Number of Licenses Forfeited for Misconduct.	To 1,000 Population.	Number per Cent. proceeded against.	Number per Cent. Convicted of Offences against good Order.	Number per Cent. whose Licenses were forfeited for Misconduct.	Number per Cent. of Informations against Licensed Houses Dismissed.	Total Number proceeded against.	Total Number Convicted.	Total Number Discharged.	Number proceeded against per 1,000 Population.	Number Convicted per 1,000 Population.	Number per Cent. proceeded against who were Discharged.	Number Convicted to each Licensed House.	Number Convicted to each Conviction of a Licensed House.
				Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.	Beer Houses.	Public Houses.													
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
Birmingham - - -	295,955	4·25	5·07	688	1,081	128	341	110	280	1	5·97	26·50	22·04	·05	16·84	1,706	539	1,167	5·76	1·82	68·40	·30	1·38
Leicester - - - -	68,168	2·96	2·11	296	151	27	30	21	25	2	6·56	12·75	10·29	·44	19·29	422	422	none	6·19	6·19	none	·94	9·17
Norwich - - - -	74,414	2·06	2·71	615	30	15	2	13	2	none	8·66	2·63	2·32	none	11·70	80	44	36	1·07	·59	45·00	·06	2·93
Nottingham - - -	74,531	4·71	2·87	243	180	19	22	19	20	none	5·67	9·69	9·21	none	4·87	215	148	67	2·88	1·98	31·16	·34	3·79
Wolverhampton - -	60,858	2·58	7·33	215	224	16	38	12	28	none	7·22	12·30	9·11	none	25·92	416	310	106	6·84	5·09	25·48	·70	7·75
Averages - - -	- -	- -	-	-	-	- -	- -	-	-	- -	6·26	17·13	14·23	·08	16·92	-	-	-	4·78	2·46	48·46	·39	2·76

Note.—These Tables have been prepared with the assistance of SUPERINTENDENT YOUNG, of the Bedfordshire force, with the permission of CAPTAIN BOULTBEE, Chief Constable of that County.

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

REPORTS upon the COUNTIES and BOROUGHS respectively.

COUNTY of BEDFORD.

Strength of Force - - - - 85.

County of Bedford.

Population, 1861 - - -	121,805	Population to one constable - -	1,433
Area in acres - - - -	281,211	Area to one constable - - -	3,308

RANKS.	Yearly Pay in £.							Weekly Pay in Shillings.					
	Chief Constable.	Superintendents.				Inspectors.		Serjeants.		Constables.			
Number and Classes	1	1	1	2	3	-	-	3	7	23	10	30	4
Rates of Pay -	£. 350	£. 162	£. 120	£. 115	£. 100	-	-	s. 25	s. 23	s. 21	s. 20	s. 19	s. 16

Chief constable's allowance for travelling, 50 *l.* per annum; superintendents for horses, 50 *l.* per annum.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	73	71	64	168	134	18
1861–62 -	105	81	74	242	198	19
1862–63 -	125	102	84	234	173	35
1863–64 -	109	100	81	211	156	36
1864–65 -	109	94	80	250	194	30

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	543	9	5
and			
Beer Houses - - - - -	390	17	14

The force has received an addition of three constables.

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging houses, inspectors of nuisances, and assistant relieving officers for casual poor, of whom 1,382 were relieved during the year, being an increase of 246 on the previous year.

Eleven constables resigned, and three were dismissed during the year. 221 known thieves, and 238 suspected persons are reported to reside within the county. The station-houses are all in good order. Four ticket-of-leave men have regularly reported themselves during the year; one has changed his residence under regulation; one has broken the condition of his license, and one has been re-committed. The co-operation with the borough of Bedford is much more satisfactory than it has been in previous years. The force is efficient.

BOROUGH of BEDFORD.

Strength of Force - - - - 13.

Borough of Bedford.

Population, 1861 - - -	13,412	Population to one constable - -	1,031
Area in acres - - - -	2,309	Area to one constable - - -	192

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.				
	Head Constable.	Inspectors.		Serjeants.		Constables.		
Number and Classes - -	1	-	-	2	1	1	4	4
Rates of Pay - - -	£. 142	-	-	24 s.	22 s.	21 s.	20 s.	19 s.

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	42	31	24	24	8	—
1861-62 -	22	23	17	35	12	6
1862-63 -	40	37	19	38	8	7
1863-64 -	32	24	21	34	9	5
1864-65 -	29	20	12	48	13	5

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	45	1	—
and Beer Houses - - - -	65	1	1

Extra Duties performed by the Police.—Inspector of weights and measures, and assistant relieving officer for casual poor, of whom 2,124 were relieved during the year, being a decrease from the previous year of 130.

One known thief only, and 19 suspected persons are reported to reside within the borough. The station-house is in order. One ticket-of-leave man has regularly reported himself during the year. The force is efficient.

COUNTY of BUCKS.

County of Bucks.

Strength of Force - - - 124.

Population, 1861 - - - 160,022 | Population to one constable - - 1,290
Area in acres - - - - 461,980 | Area to one constable - - - 3,725

RANKS.	Yearly Pay in £.							Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.				Inspectors.		Serjeants.	Constables.			
Number and Classes	1	1	2	2	1	6	5	7	23	11	35	30
Rates of Pay - -	£. 300	£. 130	£. 120	£. 115	£. 85	£. 85	£. 75	s. 23	s. 21	s. 20	s. 19	s. d. 17 6

Chief constable's allowance for travelling, 150 *l.* Average expense of horses and carts found by the county, 40 *l.* 11 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	248	146	118	230	146	—
1861-62 - -	273	175	129	301	182	59
1862-63 - -	254	160	128	334	217	54
1863-64 - -	225	149	119	334	212	60
1864-65 - -	228	169	130	446	280	79

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	781	31	24
and Beer Houses - - - - -	551	33	27

This force has received an increase of four constables as a reserve during the year.

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of lodging houses, inspectors of nuisances, high constables, and assistant relieving officers for casual poor, of whom 4,560 were relieved during the year, being an increase of 437 over the previous year. Seventeen constables resigned, and six were dismissed during the year.

107 known thieves, and 626 suspected persons, are reported to reside within the county. The new station-houses at Slough and Stratford have been completed during the year. An improvement at Aylesbury is under the consideration of the magistrates, and is much required. Ten ticket-of-leave men have reported themselves regularly during the year, and 1 has changed his residence, under the regulation. The force is efficient.

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

BOROUGH of BUCKINGHAM.

Strength of Force - - - 4.

Borough of Buckingham.

Population, 1861 - - - -	3,847	Population to one constable - -	960
Area in acres - - - -	4,777	Area to one constable - - -	1,194

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.
	Head Constable.	Constables.
Number and Classes - - -	1	3
Rates of Pay - - - -	£. 45	18*s*.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	- -	- -	- -	5	—	—
1861-62 - -	9	9	8	8	2	2
1862-63 - -	2	2	2	7	6	4
1863-64 - -	1	1	1	3	1	2
1864-65 - -	- -	- -	- -	10	4	5

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	29	1	1
and Beer Houses - - - - -	4	—	—

No extra duties are performed by the police. The force remains precisely in the same state as last year, the head constable being the governor of the prison; which offices I consider incompatible with efficiency, and the force is weak. The force is inefficient.

BOROUGH of CHIPPING WYCOMBE.

Strength of Force - - - 3.

Borough of Chipping Wycombe.

Population, 1861 - - - -	4,222	Population to one constable - -	1,407
Area in acres - - - -	120	Area to one constable - - -	40

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.
	Head Constable.	Constables.
Number and Classes - - -	1	2
Rates of Pay - - - -	£. 90	18*s*.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	25	20	17	15	—	—
1861-62 - -	18	11	9	22	15	2
1862-63 - -	11	9	9	23	8	9
1863-64 - -	13	11	10	32	15	10
1864-65 - -	14	10	8	22	16	1

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	43	—	—
and Beer Houses - - - - -	10	1	1

No extra duties are performed by the police. Eight known thieves and six suspected persons are reported to reside within the borough. One ticket-of-leave

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leave man has regularly reported himself during the year; one has changed his residence, and one has broken the condition of license. The same active officer is head constable, but the force is from weakness inefficient.

County of Cambridge.

County of Cambridge.

Strength of Force - - - - 70.

Population, 1861 - - -	85,256	Population to one constable - -	1,218
Area in acres - - - -	290,213	Area to one constable - - -	4,146

RANKS.	Yearly Pay in £.						Weekly Pay in Shillings.			
	Chief Constable.	Superintendents.			Inspectors.		Serjeants.	Constables.		
Number and Classes -	1	1	1	2	2	2	4	17	19	21
Rates of Pay - -	£. 270	£. 140	£. 105	£. 95	£. 70	£. 65	s. 23	s. 21	s. 19	s. 17

Chief constable's allowance for travelling, 80*l.* per annum; average expense of horses and carts to county, 54*l.* 16*s.* 4*d.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	60	43	35	41	26	—
1861-62 - -	66	69	60	54	38	4
1862-63 - -	78	64	52	48	31	7
1863-64 - -	56	45	40	36	31	3
1864-65 - -	112	95	74	69	46	16

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	405	3	2	3
and Beer Houses - - - - -	334	13	- - -	12

The force is exactly the same as last year.

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, and assistant relieving officers for casual poor, of whom 949 were relieved during the year, being an increase of one over the previous year.

Five constables resigned, and four were dismissed during the year. Sixty-two known thieves, and 201 suspected persons are reported to reside within the county.

The station-houses are all in good order; a new station-house is in course of erection at Arrington. Four ticket-of-leave men reported themselves regularly during the year, and two changed their residence under the regulation. The force is efficient.

Borough of Cambridge.

Borough of Cambridge.

Strength of Force - - - - 34.

Population, 1861 - - -	26,351	Population to one constable - -	775
Area in acres - - - -	3,470	Area to one stable - - - -	102

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.					
	Head Constable.	Inspectors.	Serjeants.		Constables.			
Number and Classes - -	1	2	3	1	8	10	7	2
Rates of Pay - - -	£. 156	£. 75	s. 24	s. 23	s. 21	s. 20	s. 19	s. 17

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	51	27	20	43	30	—
1861-62 - -	34	36	31	49	16	10
1862-63 - -	47	46	41	90	40	10
1863-64 - -	41	29	27	36	30	20
1864-65 - -	39	33	23	104	34	15

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	217	5	5
and Beer Houses - - - - -	40	6	6

Extra Duties performed by the Police.—Inspector of lodging-houses, inspector of nuisances, and assistant relieving officers for casual poor, of whom 1,142 were relieved during the year, being 107 less than the previous year.

Fifty-eight known thieves and 44 suspected persons are reported to reside within the borough. Four ticket-of-leave men reported themselves regularly during the year; one changed his residence under the regulation, one broke his condition of license, and one was re-committed. The force is efficient.

ISLE OF ELY.

Isle of Ely.

Strength of Force - - - - 52.

Population, 1861 - - -	55,319	Population to one constable - -	1,063
Area in acres - - - -	221,029	Area to one constable - - -	4,250

RANKS.	Yearly Pay in £.				Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.		Inspectors.	Serjeants.	Constables.			
Number and Classes -	1	2	2	2	6	12	4	15	8
Rates of Pay - -	£. 250	£. 100	£. 90	£. 70	s. 23	s. 21	s. 20	s. 19	s. 17

The chief constable is allowed 50*l.* per annum for travelling expenses. No horses are kept in this force.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	45	45	35	73	51	—
1861-62 - -	51	46	39	142	102	14
1862-63 - -	55	52	47	142	102	19
1863-64 - -	49	50	46	122	89	21
1864-65 - -	53	48	43	142	103	24

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	256	14	12
and Beer Houses - - - - -	303	10	9

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of lodging-houses, and assistant relieving officers for casual poor, of whom 888 were relieved during the year, being a decrease of 75 from those relieved the previous year.

Six constables resigned and one was dismissed during the year. Sixty-four known thieves and 267 suspected persons are reported to reside within the isle. The station-houses are all in good order. Three ticket-of-leave men reported themselves regularly to the police during the year; one changed his residence under the regulation, and one broke the condition of his license. The force is efficient.

No. 1.
Eastern Counties, Midland, and North Wales District.

Borough of Wisbeach.

BOROUGH of WISBEACH.

Strength of Force - - - - 11.

Population, 1861 - - - - -	9,218	Population to one constable - -	838
Area in acres - - - - -	6,429	Area to one constable - - -	584

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.			
	Head Constable.	Serjeants.		Constables.	
Number and Classes -	1	1	2	4	3
Rates of Pay - -	£. 100	22*s.*	21*s.*	20*s.*	18*s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	28	33	21	54	12	—
1861–62 - -	30	32	18	80	13	5
1862–63 - -	17	16	14	72	12	13
1863–64 - -	14	11	9	70	11	19
1864–65 - -	12	11	8	70	20	14

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	48	3	1	2
and Beer Houses - - - - -	30	2	- -	1

The head constable acts as assistant relieving officer for casual poor, of whom 946 were relieved during the year, being a decrease of 51 from the number relieved the previous year; one constable resigned during the year. Eleven known thieves and 40 suspected persons are reported to reside within the borough. The station-house is in good order. Two ticket-of-leave men have reported themselves regularly during the year, but no change of residence, failure in the condition of their license, or re-committal has taken place during the year. The force is efficient.

County of Derby.

COUNTY of DERBY.

Strength of Force - - - - 161.

Population, 1861 - - - -	286,400	Population to one constable - -	1,801
Area in acres - - - - -	623,990	Area to one constable - - -	3,876

RANKS.	Yearly Pay in £.								Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.						Inspectors.	Serjeants.		Constables.		
Number and Classes	1	1	4	4	1	2	3	11	15	19	40	30	30
Rates of Pay - -	£. 500	£. 150	£. 130	£. 120	£. 110	£. 100	£. 90	£. 65	*s.* 23	*s.* 22	*s.* 21	*s.* 20	*s.* 18

The chief constable receives 100*l.* per annum for travelling expenses, and the county finds horses and carts, at an average expense of 65 *l.* per annum, for each superintendent.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	251	256	232	766	606	—
1861–62 - -	256	217	192	845	677	102
1862–63 - -	249	252	208	698	553	79
1863–64 - -	205	182	162	690	547	78
1864–65 - -	179*	177	156	803	607	86

* For the 179 indictable offences, more than one person committed relates to no less than 22 offences reported.

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	1,164	22	4	18
and Beer Houses - - - -	674	47	1	42

Extra

No. 1.
Eastern Counties, Midland, and North Wales District.

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, inspectors of nuisances, inspectors of bridges, and assistant relieving officers for casual poor, of whom 2,996 were relieved during the year, being an increase of 143 over the number relieved the previous year.

Ten constables resigned during the year; seven were discharged, and four dismissed; the return of discharged, which is in no other force reported, is very ambiguous; as, in general, it is tantamount to a dismissal; but the discharged constable can obtain an appointment in another force, which system requires great caution; as, if men are unfit for one force, they do not often, if ever, turn out well in another. 344 known thieves and 792 suspected persons are reported to reside within the county. The station-house at Alfreton has been much improved; that at Buxton requires attention; and the small station at Litchurch is a case of urgency, which I have brought under the notice of the authorities. Three ticket-of-leave men have reported themselves regularly during the year; four have changed their residences under the regulation; four have broken their condition of license, and one has been re-committed. The force is efficient.

BOROUGH OF CHESTERFIELD.

Borough of Chesterfield.

Strength of Force - - - - - - 11.

Population, 1861 - - - -	9,835	Population to one constable - -	894
Area in acres - - - -	450	Area to one constable - - -	40

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.		
	Head Constable.	Inspector.	Serjeant.	Constables.	
Number and Classes - -	1	1	1	4	4
Rates of Pay - - - -	£. 100	£. 59. 16.	22 *s.*	21 *s.*	18 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	28	30	25	51	42	—
1861–62 - -	23	29	24	55	42	—
1862–63 - -	34	40	35	50	40	1
1863–64 - -	24	25	10	79	48	14
1864–65 - -	56	57	33	104	47	19

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	59	4	4
and Beer Houses - - - - -	38	6	5

Extra Duties performed by the Police.—Inspectors of common lodging-houses and assistant relieving officers for casual poor, of whom 2,487 were relieved during the year, being an increase of 1,438 over the number relieved the previous year; they have been generally in search of work.

Two constables resigned during the year.

Eleven known thieves and 13 suspected persons are reported to reside within the borough. There is no station-house belonging to the borough, the prisoners being taken to the county lock-up. One ticket-of-leave man reported himself, but changed his residence during the year, under the regulations, and one broke his condition of license. The pay of the serjeant continues below the average. The force is efficient.

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

Borough of Derby.

Strength of Force - - - - - 43.

Population, 1861 - - - 43,081 | Population to one constable - - 1,002
Area in acres - - - - 1,660 | Area to one constable - - - 38

Borough of Derby.

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.						
	Head Constable.	Inspectors.		Serjeants.			Constables.			
Number and Classes - -	1	1	2	4	2	1	7	7	8	10
Rates of Pay - - -	£. 175	£. 91	£. 70	s. 24	s. 23	s. 22	s. 21	s. 20	. 19	s. 18

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	41	54	36	232	111	—
1861–62 - -	43	48	32	253	108	42
1862–63 - -	46	47	29	280	105	36
1863-64 - -	73	82	40	324	105	47
1864–65 - -	51	50	29	340	111	28

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	209	20	15
and Beer Houses - - - - -	111	12	8

Extra Duties performed by the Police.—Inspectors of weights and measures.

Seven constables resigned during the year. Sixty-three known thieves and 65 suspected persons are reported to reside within the borough. The new station-house is in good order, but prisoners have escaped from it; and it required some alteration, which I was informed was under the consideration of the authorities. Seven ticket-of-leave men have reported themselves regularly during the year. One has broken his condition of license, and one has been re-committed. The force is efficient.

County of Essex, with Harwich and Saffron Walden, and exclusive of the Metropolitan District.

Strength of Force - - - - - 256.

Population, 1861 - - - 291,924 | Population to one constable - - 1,140
Area in acres - - - - 984,633 | Area to one constable - - - 3,846

County of Essex
with Harwich a
Saffron Walden,
and exclusive of
the Metropolitan
District.

RANKS.	Yearly Pay in £.							Weekly Pay in Shillings.			
	Chief Constable.	Superintendents.			Inspectors.			Serjeants.	Constables.		
Number and Classes -	1	3	3	4	5	4	4	11	107	58	56
Rates of Pay - - -	£. 450	£. 130	£. 115	£. 100	£. 85	£. 75	£. 65	s. 23	s. 21	s. 19	s. 17

The chief constable receives 160 *l.* per annum for travelling expenses, and the deputy chief constable has 50 *l.* per annum extra. Horses and carts are found by the county, at the average yearly expense of 52 *l.* 3 *s.* 5 *d.*

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	490	267	212	145	92	—
1861–62 - -	496	266	215	258	169	37
1862–63 - -	517	257	228	258	169	51
1863–64 - -	409	260	227	289	207	48
1864–65 - -	357	207	171	246	163	46

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	996	18	1	16
and Beer Houses - - - - -	820	16	- -	13

This force has received an increase of ten constables during the year.

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, and assistant relieving officers for casual poor, of whom 5,814 were relieved during the year, being an increase of 272 over the number relieved the previous year.

Ten constables resigned and two were dismissed during the year. 205 known thieves and 652 suspected persons are reported to reside within the county and consolidated boroughs. The station-houses are all in excellent order. Twenty-three ticket-of-leave men reported themselves regularly during the year; three changed their residences under the regulation; three broke the condition of their license, and two were re-committed. All the constables hold deputations under the Customs. The force is efficient.

BOROUGH OF COLCHESTER.

Strength of Force - - - - 22.

Borough of Colchester.

Population, 1861 - - -	23,730	Population to one constable - -	1,078
Area in acres - - - -	11,770	Area to one constable - - -	53

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.			
	Head Constable.	Serjeants.	Constables.		
Number and Classes -	1	3	6	6	6
Rates of Pay - -	£. 104	23 *s.*	20 *s.*	18 *s.* 6 *d.*	17 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	75	63	33	56	18	—
1861–62 - -	85	47	40	64	11	13
1862–63 - -	89	46	33	53	18	8
1863–64 - -	100	41	20	54	10	12
1864–65 - -	85	59	35	67	17	16

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	108	—	—
and Beer Houses - - - - -	38	2	2

The pay of this force is proposed to be increased on the 9th November; the head constable 16 *l.* per annum, the serjeants 1 *s.* 6 *d.* per week, and the constables 1 *s.* per week, in all classes.

Extra

Extra Duties performed by the Police.—Inspector of common lodging-houses, and assistant relieving officer for casual poor, of whom 1,436 were relieved during the year, being an increase of 96 over the number relieved the previous year.

One constable resigned during the year. Thirty-seven known thieves and 54 suspected persons are reported to reside within the borough. The station-house is kept remarkably clean. Three ticket-of-leave men reported themselves regularly during the year; one changed his residence under the regulation; two broke the condition of license, and three were re-committed. The force is efficient.

BOROUGH of MALDON.

Borough of Maldon.

Strength of Force - - - - 2.

Population, 1861 - - - -	4,747	Population to one constable - -	2,373
Area in acres - - - -	3,508	Area to one constable - - -	1,754

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.
	Head Constable.	Constable.
Number of Classes - - - -	1	1
Rates of Pay - - - - -	£.65	20 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	4	4	4	2	1	—
1861-62 - -	1	1	1	6	2	1
1862-63 - -	1	1	1	5	1	2
1863-64 - -	3	3	3	2	1	1
1864-65 - -		1	—	—	—	—

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	22	—	—
and			
Beer Houses - - - - -	7	1	1

According to the return there has been no indictable offence reported, although one person was apprehended for such an offence. There are only two suspected persons reported to reside in the borough. The alterations which I have year by year reported to be necessary at the station-house have at length been done. One ticket-of-leave man has regularly reported himself. The force remains inefficient.

COUNTY of HERTFORD.

County of Hertford.

Strength of Force - - - - 92.

Population, 1861 - - -	141,209	Population to one constable - -	1,534
Area in acres - - - -	368,810	Area to one constable - - -	4,008

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.		
	Chief Constable.	Super-intendents.	Inspectors.	Constables.		
Number and Classes - -	1	4	9	30	30	18
Rates of Pay - - - -	£. 500*	£. 95	£. 75	21 *s.*	19 *s.*	17 *s.*

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* The chief constable's allowance for travelling is included in the pay; and the carts and horses are found by the county, at the average expense of 43 *l.* per annum.

No. 1.
Eastern Counties,
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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	145	134	102	190	130	—
1861–62 - -	151	146	110	275	190	42
1862–63 - -	202	164	126	319	214	37
1863–64 - -	191	153	136	330	210	35
1864–65 - -	199	152	102	304	207	25

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	705	15	12
and Beer Houses - - - - -	629	26	23

Extra Duties performed by the Police.—Inspectors of weights and measures.

One constable resigned and one was dismissed during the year. 471 known thieves and 707 suspected persons are reported to reside within the county. The station-house at Stevenage requires improvement. The police do not undertake the general inspection of common lodging-houses or the relief of vagrants; both, I consider, important duties in their hands. Twenty ticket-of-leave men have regularly reported themselves during the year; two have changed their residence under regulation; three have broken their condition of license, and three have been re-committed. The force is efficient.

Borough of St. Alban's.

Borough of
St. Alban's.

Strength of Force - - - - - - 7.

Population, 1861 - - -	7,675	Population to one constable - -	1,096
Area in acres - - - -	434	Area to one constable - - -	62

Ranks.	Yearly Pay in £.	Weekly Pay in Shillings.		
	Head Constable.	Serjeants.	Constables.	
Number and Classes - - -	1	2	2	2
Rates of Pay - - - -	£. 100	23 *s.*	20 *s.*	18 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	18	13	17	43	27	—
1861–62 - -	17	13	12	37	22	3
1862–63 - -	29	17	15	40	13	2
1863–64 - -	17	15	15	52	12	9
1864–65 - -	24	15	12	63	22	5

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	56	3	3
and Beer Houses - - - - -	23	1	1

Extra Duties performed by the Police.—Inspector of weights and measures, common lodging-houses, and nuisances.

Four known thieves and 11 suspected persons are reported to reside within the borough. The station-house, though small, is in good order, and the cells clean. Three ticket-of-leave men have regularly reported themselves during the year, and one has changed his residence under the regulation. The force is efficient.

Borough of Hertford.

BOROUGH of HERTFORD.

Strength of Force - - - - - 6.

Population, 1861 - - -	6,769	Population to one constable - -	1,128
Area in acres - - - -	3,350	Area to one constable - - -	558

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.			
	Head Constable.	Inspector.	Serjeants.		Constables.	
Number and Classes - -	1	- -	1	1	2	1
Rates of Pay - - - -	£. 72. 16 s.	- -	25 s.	22 s.	20 s.	19 s.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	2	2	2	14	6	—
1861-62 - -	4	2	- - -	15	10	—
1862-63 - -	11	6	2	43	24	6
1863-64 - -	10	7	4	19	10	5
1864-65 - -	9	7	5	30	15	8

	Number of	Proceeded against.	Fined.
Public Houses - - - -	49	1	—
and Beer Houses - - - - -	22	1	1

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, and inspector of nuisances, but not assistant relieving officer for casual poor.

Twenty-eight known thieves and 40 suspected persons are reported to reside within the borough. The station-house, which has been much improved, is in good order. One ticket-of-leave man has regularly reported himself during the year. The force is efficient.

County of Huntingdon, with the Boroughs of Godmanchester and Huntingdon.

COUNTY of HUNTINGDON, with GODMANCHESTER and HUNTINGDON.

Strength of Force - - - - - 52.

Population, 1861 - - -	64,250	Population to one constable - -	1,235
Area in acres - - - -	224,[illegible]18	Area to one constable - - -	4,315

RANKS.	Yearly Pay in £.					Weekly Pay in Shillings.			
	Chief Constable.	Superintendents.			Inspector.	Serjeants.	Constables.		
Number and Classes -	1	1	1	2	1	3	15	14	14
Rates of Pay - - -	£. 180	£. 130	£. 105	£. 95	£ 70	s. 23	s. 21	s. 19	s. 17

The chief constable is allowed 70 *l.* for travelling expenses; the horses and carts are found by the county, at an average of 45 *l.* 5 *s.* per annum.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	54	45	39	40	36	—
1861-62 - -	63	54	49	110	85	12
1862-63 - -	67	51	45	71	43	11
1863-64 - -	57	40	31	105	41	37
1864-65 - -	48	40	36	87	33	23

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	312	2	2
and Beer Houses - - - - -	320	3	2

Extra Duties performed by the Police.—Inspectors of weights and measures, and assistant relieving officer for casual poor, of whom 3,114 were relieved during the year, being an increase of 155 over the number relieved the previous year.

Two constables resigned and one was dismissed during the year. Forty-five known thieves and 109 suspected persons are reported to reside within the county. The station-houses are all in good order. Four ticket-of-leave men have regularly reported themselves during the year; the common lodging-houses require attention, as I found on my inspection some not registered. The force is efficient.

County of Leicester.

County of Leicester.

Strength of Force - - - 103.

Population, 1861 - - -	169,356	Population to one constable - -	1,644
Area in acres - - - -	510,204	Area to one constable - -	4,956

RANKS.	Yearly Pay in £.					Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.			Inspectors.	Serjeants.		Constables.		
Number and Classes -	1	1	2	3	3	11	2	30	31	19
Rates of Pay - -	£. 450	£. 130	£. 120	£. 100	£. 75	s. 23	s. 22	s. 21	s. 19	s. 17

The chief constable is allowed 95 *l.* for travelling expenses; the horses and carts are found by the county, and average 50 *l.* 11 *s.* per annum.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	212	165	128	221	187	—
1861–62 - -	237	230	148	249	187	43
1862–63 - -	191	161	130	291	196	62
1863–64 - -	149	141	105	341	258	49
1864–65 - -	174	152	102	255	194	29

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	767	10	9
and Beer Houses - - - - -	218	14	12

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, and high constables in five petty sessional divisions. Assistant relieving officers for casual poor, of whom 5,339 were relieved during the year, being an increase of 729 over the number relieved the previous year.

Ten constables resigned, and five were dismissed during the year. 132 known thieves and 260 suspected persons are reported to reside within the county. The station-houses are all in the best repair; the head Leicester station being about to be much improved, particularly the cells. Two ticket-of-leave men regularly reported themselves during the year, and one was re-committed. On my inspection I found the force had been much harassed by the duty attendant upon the general election, but it is in every particular efficient.

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

Borough of Leicester.

Borough of Leicester.

Strength of Force - - - 75.

Population, 1861 - - - -	68,168	Population to one constable - -	885
Area in acres - - - -	3,000	Area to one constable - - -	40

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.						
	Head Constable.	Inspectors.		Serjeants.			Constables.			
Number and Classes -	1	1	1	4	5	3	31	11	9	9
Rates of Pay - -	£. 200	£. 120	£. 112	s. 26	s. 25	s. 23	s. d. 21 6	s. d. 20 6	s. d. 19 6	s. d. 18 6

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	204	95	59	218	199	—
1861-62 - -	241	135	72	267	151	73
1862-63 - -	180	110	66	274	157	84
1863-64 - -	200	121	68	350	211	107
1864-65 - -	202	147	77	422	298	124

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	296	27	2	21
and				
Beer Houses - - - -	151	30	- -	25

Extra Duties performed by the Police.— Nil.

Nine constables were dismissed and 10 resigned during the year. The pay of this force is increased, for five years' good conduct, 1 *d.* per day. 106 known thieves and 38 suspected persons are reported to reside within the borough. The station-house is in good repair. Five ticket-of-leave men have regularly reported themselves during the year; two have broke their condition of license, and three have been re-committed.

The co-operation between this force and the county force is a good example in that respect, the best understanding existing between them. The force is efficient.

County of Lincoln, comprising Lindsey, Kesteven, and Holland.

County of Lincoln, comprising Lindsey, Kesteven, and Holland.

Strength of Force - - - - 268.

Population, 1861 - - -	343,140	Population to one constable - -	1,304
Area in acres - - - -	1,742,329	Area to one constable - - -	6,500

RANKS.	Yearly Pay in £.						Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.				Inspectors.	Serjeants.		Constables.		
Number and Classes - -	1	1	8	6	4	4	10	25	99	54	56
Rates of Pay - - -	£. 500	£. 120	£. 110	£. 95	£. 85	£. 70	s. 25	s. 24	s. 21	s. d. 19 6	s. 18

Chief constable's allowance for travelling expenses, 200 *l.* For Lindsey, average expenses for horses and carts, found by county, 42 *l.* 1 *s.* 7 *d.* In Kesteven and Holland, superintendents are allowed 50 *l.* per annum for horses.

No. 1.
Eastern Counties,
Midland,
and North Wales
District

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	410	372	323	766	687	—
1861–62 - -	500	381	301	901	622	119
1862–63 - -	471	364	272	741	489	130
1863–64 - -	459	389	317	891	643	149
1864–65 - -	414	324	249	1,095	847	149

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	1,079	57	5	36
and Beer Houses - - - -	607	44	- -	36

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, inspector of nuisances, and high constables.

Thirty-seven constables resigned during the year, and 15 were dismissed; 287 known thieves, and 927 suspected persons are reported to reside within the county. New station-houses are building at Louth, Crowle and Croyland. One is ordered to be built at Wainfleet, and one is much required at Navenby. Sixteen ticket-of-leave men have regularly reported themselves during the year, four have changed their residence under the regulation; one has broken his condition of license, and two have been re-committed. The system established last year of having a qualified class of constables working their own beats at discretion, instead of by points, has been tried for more than 12 months with success, and I can recommend it to be tested in other forces. On my inspection I found the weights and measures in Kesteven had not been sent up for verification, which was necessary as the time for it had expired. The force is efficient.

BOROUGH of BOSTON,

Strength of Force - - - - 15.

Borough of
Boston.

Population, 1861 - - -	15,038	Population to one constable - -	1,000
Area in acres - - - -	4,820	Area to one constable - - -	200

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.					
	Head Constable.	Serjeants.			Constables.		
Number and Classes -	1	1	1	1	5	5	1
Rates of Pay - - -	£. 120	s. 26	s. 24	s. 23	s. d. 21 6	s. d. 18 6	s. d. 17 6

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	35	39	32	136	75	—
1861–62 -	27	35	25	168	58	49
1862–63 -	52	57	40	133	50	40
1863–64 -	43	31	17	124	37	31
1864–65 -	30	43	26	126	48	38

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	46	6	6
and Beer Houses - - - - -	44	11	11

Extra Duties performed by the Police.—Assistant relieving officer for casual poor, of whom 954 were relieved during the year, being an increase of 54 for the previous year.

Twelve

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

Twelve known thieves, and 16 suspected persons are reported to reside within the borough. The station-house is in good order, and remarkably well kept. One ticket-of-leave man broke his condition of license, and one was re-committed. This is the last remaining force which sticks to the old dress, instead of giving the men tunics, which add to the appearance and comfort of the men. The superannuation fund is weak, and is likely to be so, as there are three constables on it, and no fees for the service of summonses or the execution of warrants are received.

The force is efficient.

BOROUGH of GRANTHAM.

Borough of Grantham.

Strength of Force - - - - 5.

Population in 1861 - - - 4,954 | Population to one constable - - 991
Area in acres - - - - 314 | Area to one constable - - - 63

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.	
	Head Constable.	Serjeant.	Constables.
Number and Classes - - - -	1	1	3
Rates of Pay - - - - -	£. 70	23 *s.*	19 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	32	19	16	9	6	—
1861–62 - -	8	5	5	7	5	—
1862–63 - -	14	8	6	8	3	2
1863–64 - -	27	21	17	36	26	3
1864–65 - -	32	29	26	68	50	7

	Number of	Proceeded against.	Fined.
Public Houses - - - -	33	1	1
and Beer Houses - - - - -	17	1	—

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, and assistant relieving officer for casual poor, of whom 1,886 were relieved during the year, being an increase of 283 over the number relieved the previous year.

One constable was dismissed and one resigned during the year. Nine known thieves and six suspected persons are reported to reside within the borough. The station-house, which is but moderate, might be much improved now the gaol, of which it is a part, is being repaired. One ticket-of-leave man reported himself, and changed his residence, under the regulation during the year.

The force is efficient.

BOROUGH of GREAT GRIMSBY.

Borough of Great Grimsby.

Strength of Force - - - - - 10.

Population, 1861 - - - 11,032 | Population to one constable - - 1,067
Area in acres - - - - 1,518 | Area to one constable - - - 143

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.			
	Head Constable.	Serjeants.		Constables.	
Number and Classes - - -	1	1	1	2	5
Rates of Pay - - - - -	£. 100	26 *s.*	25 *s.*	20 *s.*	18 *s.*

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	47	19	19	76	68	—
1861–62 - -	48	37	28	60	35	13
1862–63 - -	43	24	24	97	65	15
1863–64 - -	73	41	25	121	74	32
1864–65 - -	46	34	22	100	64	20

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	34	5	3
and			
Beer Houses - - - - -	33	2	2

Extra Duties performed by the Police.—Nil.

Two constables resigned during the year. Twenty-one known thieves and 16 suspected persons are reported to reside within the borough. The station-house, which is a very good and new lock-up, is in good order. Two ticket-of-leave men reported themselves regularly during the year; one changed his residence under the regulation, and one broke the condition of his license.

The force is efficient.

City of Lincoln.

City of Lincoln.

Strength of Force - - - - 21.

Population, 1861 - - -	20,995	Population to one constable - -	999
Area in acres - - - -	5,000	Area to one constable - - -	250

Ranks.	Yearly Pay in £.		Weekly Pay in Shillings.			
	Head Constable.	Inspector.	Serjeants.		Constables.	
Number and Classes - -	1	1	2	3	8	6
Rates of Pay - - -	£.120	£.78	26*s.*	24*s.* 6*d.*	21*s.* 6*d.*	19*s.* 6*d.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	28	22	18	38	14	—
1861–62 - -	25	18	13	64	16	3
1862–63 - -	39	40	30	88	24	15
1863–64 - -	18	13	10	67	22	19
1864–65 - -	21	24	22	88	39	12

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	107	—	—
and			
Beer Houses - - - - -	42	6	5

Extra Duties performed by the Police.—Inspectors of weights and measures and inspectors of common lodging houses.

Two constables resigned, and one was dismissed during the year. Six known thieves and 27 suspected persons are reported to reside within the city. The station-house is in good order. One ticket-of-leave man reported himself regularly during the year; one changed his residence under the regulation, and one broke his condition of license.

In the return of indictable offences, 10 persons were committed for four offences, which accounts for the large number of committals in proportion to crimes reported. An addition of two constables, and the promotion of four second class constables to be first class, took place on the 30th September 1865.

The force is efficient.

Borough of Louth.

BOROUGH of LOUTH.

Strength of Force - - - - - 6.

Population, 1861 - - -	10,468	Population to one constable - - -	1,744
Area in acres - - - -	2,560	Area to one constable - - -	440

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.		
	Head Constable.	Inspectors.	Serjeants.	Constables.	
Number and Classes - -	1	- -	1	2	2
Rates of Pay - - - -	£. 123	- -	23 s.	20 s.	19 s.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons. proceeded against.	Fined.	Committed.
1860–61 - -	41	32	15	28	28	—
1861–62 - -	20	15	5	17	14	—
1862–63 - -	35	26	12	46	25	—
1863–64 - -	20	17	16	29	21	—
1864–65 - -	17	11	5	47	39	—

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	29	—	—
and Beer Houses - - - - -	16	4	4

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of nuisances, and assistant relieving officer for casual poor, of whom 696 were relieved during the year, being 151 less than the number relieved the previous year.

One serjeant was dismissed during the year. Twelve known thieves and 16 suspected persons are reported to reside within the borough. The station-house is in excellent order. The force remains too weak in number, and is therefore inefficient.

BOROUGH of STAMFORD.

Borough of Stamford.

Strength of Force - - - - - - 10.

Population, 1861 - - - -	8,044	Population to one constable - -	804
Area in acres - - - -	1,711	Area to one constable - - -	171

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.				
	Head Constable.	Inspectors.	Serjeants.		Constables.		
Number and Classes -	1	- -	2	1	2	2	2
Rates of Pay - -	£. 100	- -	25 s.	22 s.	21 s.	20 s.	18 s.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	9	9	4	81	13	3
1861–62 - -	17	19	6	90	14	4
1862–63 - -	14	12	9	65	15	8
1863–64 - -	15	14	9	61	5	6
1864–65 - -	22	15	12	81	13	3

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	68	1	—
and Beer Houses - - - - -	8	—	—

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, inspector of nuisances, and assistant relieving officer for casual poor, of whom 2,089 were relieved during the year, being an increase of 95 over the number relieved the previous year.

One constable resigned during the year. Seven known thieves and 12 suspected persons are reported to reside within the borough. The station-house is in good order. The standard weights and measures required verification. The force was one constable short on my inspection. It is efficient.

COUNTY of NORFOLK, with the BOROUGH of THETFORD.

Strength of Force - - - - - 222.

County of Norfolk, with the Borough of Thetford.

Population, 1861 - - -	317,295	Population to one constable - -	1,442
Area in acres - - - -	1,333,440	Area to one constable - - -	6,061

RANKS.	Yearly Pay in £.						Weekly Pay in Shillings.			
	Chief Constable.	Superintendents.				Inspectors.	Serjeants.	Constables.		
Number and Classes -	1	1	4	5	4	9	8	78	76	36
Rates of Pay - - -	£. 400	£. 170	£. 120	£. 115	£. 100	£. 72	s. 23	s. 21	s. 19	s. 17

Chief constable's allowance for travelling, 175 *l.*; average expenses of horses and carts provided the county, 41 *l.* per annum.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	307	266	219	218	168	—
1861-62 - -	338	301	258	299	241	41
1862-63 - -	326	259	215	326	253	44
1863-64 - -	323	320	264	364	277	41
1864-65 - -	269	263	215	370	310	44

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	1,240	25	3	22
and Beer Houses - - - - -	545	31	- -	28

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, inspectors of nuisances, and assistant relieving officers for casual poor, of whom 719 were relieved during the year, being 21 less than the number relieved the previous year.

Ten constables resigned, and one was dismissed during the year. 558 known thieves and 737 suspected persons are reported to reside within the county and borough of Thetford. The station-houses are all in good order, that at Norwich having been enlarged and improved. Terrington station remains requiring improvement. Eight ticket-of-leave men have regularly reported themselves during the year, two have changed their residence under the regulation, and one has broken the condition of his license. The magistrates have it in contemplation under the recommendation to increase the ranks and number of the force, which I have frequently reported as of great importance to the efficiency of the force, and which will, I am satisfied, meet with every due consideration at the proper time.

The force is efficient.

BOROUGH of GREAT YARMOUTH.

Borough of Great Yarmouth.

Strength of Force - - - - - - 34.

Population, 1861 - - - -	34,573	Population to one constable - -	1,016
Area in acres - - - -	4,135	Area to one constable - - -	121

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.				
	Head Constable.	Inspector.	Serjeants.		Constables.		
Number and Classes -	1	1	2	4	9	9	8
Rates of Pay - - -	£. 162	£. 72	25 *s.*	21 *s.*	20 *s.*	18 *s.* 6 *d.*	17 *s.* 6 *d.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	104	53	38	112	92	—
1861-62 - -	136	58	37	116	103	2
1862-63 - -	100	56	34	216	178	13
1863-64 - -	66	49	33	214	187	17
1864-65 - -	62	51	36	201	171	16

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	182	14	9
and Beer Houses - - - - -	85	14	10

Extra Duties performed by the Police. — Inspector of common lodging-houses, and assistant relieving officer for casual poor, of whom 382 were relieved during the year, being 11 less than the number relieved the previous year.

One constable resigned during the year. Forty-nine known thieves and 53 suspected persons are reported to reside within the borough. The station-house and cells are in good order. One ticket-of-leave man reported himself regularly during the year. One changed his residence under the regulation, one broke his condition of license, and one was re-committed. The head constable has received an increase of pay amounting to 12 *l.* per annum, which I consider he has fairly earned.

The force is efficient.

BOROUGH of KING'S LYNN.

Borough of King's Lynn.

Strength of Force - - - - - - 18.

Population, 1861 - - - -	15,981	Population to one constable - -	841
Area in acres - - - -	2,620	Area to one constable - - -	178

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.			
	Head Constable.	Inspectors.	Serjeants.		Constables.	
Number and Classes - - -	1	- -	3	1	7	6
Rates of Pay - - - -	£. 100	- -	23 *s.*	21 *s.*	20 *s.*	18 *s.*

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	51	35	25	31	14	—
1861-62 - -	41	30	18	71	27	20
1862-63 - -	39	33	13	56	21	12
1863-64 - -	22	16	8	83	40	24
1864-65 - -	14	20	9	98	51	26

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	155	4	4
and Beer Houses - - - - -	9	—	—

Extra Duties performed by the Police.—Assistant relieving officer for casual poor, of whom 532 were relieved during the year, being 46 less than those relieved during the previous year.

One known thief only, and four suspected persons are reported to reside within the borough, which being so unusual a return considering the population of the borough, I caused an inquiry to be made, so that there might be no mistake, when the same figures were again returned.

One constable having lately died, makes a vacancy which it is necessary should be filled up. The station-house is in good order; on my inspection I recommended the limit of the classes to be removed when any constable was reported fit for promotion to the 1st class.

The force is efficient.

CITY of NORWICH.

City of Norwich.

Strength of Force - - - - - 91.

Population, 1861 - - - - 74,414 | Population to one constable - - 816
Area in acres - - - - 6,638 | Area to one constable - - - 72

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.						
	Head Constable.	Superintendents.	Inspectors.	Serjeants.			Constables.			
Number and Classes -	1	1	5	1	8	4	11	26	14	20
Rates of Pay - -	£. 250	£. 104	£. 78	s. 25	s. 24	s. 23	s. 21	s. 20	s. 19	s. 18

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	279	147	64	138	46	35
1861-62 - -	182	166	104	140	47	34
1862-63 - -	164	140	81	130	38	17
1863-64 - -	155	113	77	118	40	12
1864-65 - -	154	123	91	80	31	13

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	615	15	13
and Beer Houses - - - - -	30	2	2

Extra Duties performed by the Police.—Nil.

One constable was dismissed and eight resigned during the year; three of whom were requested to resign, tantamount to dismissal.

One hundred known thieves and 102 suspected persons are reported to reside within the city. The station-house and cells are in good order. Four ticket-of-leave men reported themselves regularly during the year; one changed
his

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his residence under regulation, one broke his condition of license, and three were re-committed.

The head constable's pay has been advanced 50 *l.* per annum, which shows the confidence of the authorities, which is supported by the appearance and working of the force.

This force has also the advantage of no limit to promotion.

The force is efficient.

COUNTY OF NORTHAMPTON.

Strength of Force - - - - - 110.

County of
Northampton.

Population, 1861 - - -	167,854	Population to one constable - -	1,526
Area in acres - - - -	575,763	Area to one constable - - -	5,234

RANKS.	Yearly Pay in £.							Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.				Inspectors-		Serjeants.	Constables.			
Number and Classes -	1	1	1	2	1	4	6	11	16	18	34	15
Rates of Pay - -	£. 300	£. 110	£. 105	£. 100	£. 95	£. 85	£. 75	s. 23	s. 21	s. 20	s. 19	s. 17

Chief constable's allowance for travelling expenses, 110 *l.*, and the superintendents are allowed 50 *l.* per annum to find and keep their horses.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	211	120	108	188	128	40
1861–62 -	253	165	145	291	202	53
1862–63 -	230	134	130	295	191	54
1863–64 -	195	139	114	348	229	81
1864–65 -	243	150	130	303	204	53

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	623	10	1	9
and Beer Houses - - - - -	379	10	- -	8

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, inspectors of nuisances, and assistant relieving officers for casual poor, of whom 4,830 were relieved during the year, being 110 more than the number relieved the previous year.

Seventeen constables resigned, and six were dismissed during the year. Eighty-eight known thieves and 115 suspected persons are reported to reside within the county. The station-house at Wellingborough is about to be vacated, and a new station-house is to be erected at that place; all the other station-houses are in good order, the old lock-up at Oundle being now the only station where anything is required to be done. Eight ticket-of-leave men have regularly reported themselves during the year; one has changed his residence under the regulation, one has broken his condition of license, and one has been re-committed for that offence. This force has been increased during the year by one serjeant and five constables. The second class remains limited, which point has been brought before the court of quarter sessions by the chief constable, and is one of importance to the chance of promotion necessary in keeping good men in the force. The force is efficient.

BOROUGH OF DAVENTRY.

Borough of Daventry.

Strength of Force - - - - - - 2.

Population, 1861 - - - -	4,124	Population to one constable - -	2,062
Area in acres - - - -	1,713	Area to one constable - - -	856

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.
	Head Constable.	Constable.
Number and Classes - - -	1	1
Rates of Pay - - - -	£. 60	20 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	5	5	4	11	8	—
1861–62 - -	6	6	4	15	2	2
1862–63 - -	12	12	10	30	15	8
1863–64 - -	11	15	10	27	14	4
1864–65 - -	1	1	-	15	5	1

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	28	2	2
and			
Beer Houses - - - - -	3	1	1

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, and inspector of nuisances.

Two known thieves and 13 suspected persons are reported to reside within the borough. The station-house is in good order; the force is too weak in number, and inefficient.

BOROUGH OF NORTHAMPTON.

Borough of Northampton.

Strength of Force - - - - - - 39.

Population, 1861 - - -	32,813	Population to one constable - -	844
Area in acres - - - -	1,520	Area to one constable - - -	39

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.				
	Head Constable.	Inspectors.	Serjeants.		Constables.		
Number and Classes -	1	2	2	2	14	11	7
Rates of Pay - -	£. 200	£. 89	26 *s.*	24 *s.*	21 *s.*	19 *s.*	18 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	56	38	31	80	75	—
1861–62 - -	84	63	52	107	104	—
1862–63 - -	86	66	55	135	135	—
1863–64 - -	95	74	60	145	139	—
1864–65 - -	97	58	52	147	145	1

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	70	9	8
and			
Beer Houses - - - - -	201	51	43

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Extra Duties performed by the Police.—Inspector of weights and measures and inspector of common lodging-houses.

Two constables were dismissed, and eight resigned during the year; 38 known thieves and 35 suspected persons are reported to reside within the borough. The station-house is at present undergoing alteration, which was very necessary. Two ticket-of-leave men reported themselves regularly during the year. One changed his residence according to regulation, and two broke the condition of their license. The co-operation with the county force is well carried out. The force is efficient.

LIBERTY of PETERBOROUGH.

Liberty of Peterborough.

Strength of Force - - - - - - - 18.

Population, 1861 - - -	22,655	Population to one constable - -	1,258
Area in acres - - - -	51,695	Area to one constable - - -	2,871

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.				
	Chief Constable.	Deputy Chief Constable.	Inspector.	Serjeants.	Constables.			
Number and Classes -	1	1	1	2	5	4	3	1
Rates of Pay - -	£. 105	£. 100	£. 80	s. 23	s. 21	s. 20	s. 19	s. 17

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	26	18	15	9	6	—
1861–62 - -	48	46	43	16	10	—
1862–63 - -	45	33	29	28	16	7
1863–64 - -	42	29	29	23	10	8
1864–65 - -	47	42	40	22	13	8

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	95	1	1
and Beer Houses - - - - -	79	3	2

Extra Duties performed by the Police.—Inspector of weights and measures and inspector of common lodging-houses, and assistant relieving officer for casual poor, of whom 1,672 were relieved during the year, being 59 more than the number relieved the previous year.

Two constables resigned, and one was dismissed during the year; 42 known thieves and 32 suspected persons are reported to reside within the liberty; this remarkably good station is in the best order. One ticket-of-leave-man regularly reported himself during the year, and one changed his residence under the regulation. The force is working well with the several county and borough forces around the liberty.

The force is efficient.

COUNTY of NOTTINGHAM, with EAST RETFORD.

County of Nottingham.

Strength of Force - - - - 138.

Population, 1861 - - -	207,691	Population to one constable - -	1,505
Area in acres - - - -	521,110	Area to one constable - - -	3,776

RANKS.	Weekly Pay in £.							Weekly Pay in Shillings.			
	Chief Constable.	Superintendents.					Inspectors.	Serjeants.	Constables.		
Number and Classes -	1	1	1	3	1	1	6	16	47	35	26
Rates of Pay - -	£. 350	£. 120	£. 115	£. 95	£. 90	£. 80	£. 70	s. 24	s. 21	s. 19	s. 17

The chief constable is allowed 150 *l.* per annum for travelling expenses; each superintendent receives 50 *l.* per annum, to find and keep a horse.

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons Proceeded against.	Fined.	Committed.
1860-61 - -	235	207	155	474	290	—
1861-62 - -	285	255	176	664	444	95
1862-63 - -	211	229	170	669	481	72
1863-64 - -	164	169	140	706	455	121
1864-65 - -	178	204	*181	641	403	97

* In the number of committals, several were for one offence, and 12 were for one riot.

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	752	38	3	23
and Beer Houses - - - - -	276	50	- -	35

Extra Duties performed by the Police.—Inspector of weights and measures, and inspector of common lodging-houses.

Eight constables resigned and 13 were dismissed during the year. 145 known thieves and 786 suspected persons are reported to reside within the county. The station-houses are all in good order. Twenty-one ticket-of-leave men regularly reported themselves during the year; four changed their residences under the regulation and two were recommitted. The large number of committals in proportion to the indictable offences is accounted for by several persons having been committed for one riot, and also several cases for which more than one person was committed. The force is efficient.

BOROUGH OF NEWARK.

Borough of Newark.

Strength of Force - - - - 11.

Population, 1861 - - - -	11,562	Population to one constable - -	1,051
Area in acres - - - -	2,080	Area to one constable - - -	190

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.		
	Head Constable.	Inspector.	Serjeants.	Constables.	
Number and Classes -	1	- - -	2	5	3
Rates of Pay - -	£. 130	- - -	24 s.	20 s.	19 s.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons Proceeded against.	Fined.	Committed.
1860-61 - -	17	17	11	28	13	—
1681-62 - -	14	13	13	28	10	8
1862-63 - -	14	17	17	27	11	6
1863-64 - -	10	9	9	20	9	4
1864-65 - -	11	10	9	25	15	6

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	55	4	4
and Beer Houses - - - - -	29	1	1

Extra Duties performed by the Police.—Nil.

One constable resigned during the year. Six known thieves and four suspected persons are reported to reside within the borough. The cells are in order and kept clean. The force is efficient.

BOROUGH of NOTTINGHAM.

Strength of Force - - - - 100.

Borough of Nottingham.

Population, 1861 - - -	74,531	Population to one constable - -	745
Area in acres - - - -	2,600	Area to one constable - - -	26

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.						
	Head Constable.	Superintendent.	Inspectors.	Serjeants.		Constables.				
Number and Classes -	1	1	4	2	10	7	12	27	10	26
Rates of Pay - -	£. 325	£. 155	£. 80	s. 26	s. 24	s. 21	s. d. 20 6	s. 20	s. 19	s. 18

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons Proceeded against.	Fined.	Committed.
1860-61 - -	238	129	51	13	5	—
1861-62 - -	280	148	61	176	97	43
1862-63 - -	283	123	60	120	77	24
1863-64 - -	204	76	44	111	65	25
1864-65 - -	350	101	58	215	110	38

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	243	19	19
and - - - - -			
Beer Houses - - - - -	180	22	20

Extra Duties performed by the Police.—Nil.

Five constables were dismissed and 14 resigned during the year. 129 known thieves and 85 suspected persons are reported to reside within the borough. The station-house is in good repair. Twelve ticket-of-leave men regularly reported themselves during the year; two changed their residences under the regulation; two broke their condition of license, and three were re-committed. There has been a change in the head constable during the year; in other respects the force is much in the same state as last year. The force is efficient.

COUNTY of OXFORD.

Strength of Force - - - 95.

County of Oxford.

Population, 1861 - - -	140,730	Population to one constable - -	1,480
Area in acres - - - -	469,935	Area to one constable - - -	4,946

RANKS.	Yearly Pay in £.						Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.			Inspectors.		Serjeants.	Constables.			
Number and Classes -	1	Deputy Chief Constable.	4	2	2	2	10	15	9	36	13
Rates of Pay - -	£. 375	£. 110	£. 105	£. 80	£. 75	£. 70	s. 23	s. 21	s. 20	s. 19	s. 17

Chief constable's allowances for travelling expenses, 125 *l.* Horses and carts found by county, at an average expense of 44 *l.* 5 *s.* per annum; an extra cart horse and harness has been purchased during the year.

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	174	116	85	235	145	52
1861–62 - -	161	168	127	294	169	53
1862–63 - -	147	147	103	251	131	49
1863–64 - -	124	112	93	326	194	41
1864–65 - -	109	102	80	251	139	46

	Number of.	Proceeded against.	Fined.
Public Houses - - - - and	592	20	14
Beer Houses - - - - -	402	20	12

Extra Duties performed by the Police.—Inspectors of weights and measures, and inspectors of common lodging-houses, high constables, and assistant relieving officers for casual poor, of whom 4,859 have been relieved during the year, being an increase of 1,996 over the number relieved the previous year, which increase may be accounted for by the return from two unions, Watlington and Bampton, not having been included in the previous year.

Seven constables resigned, and three were dismissed during the year; 192 known thieves, and 340 suspected persons are reported to reside within the county. A new station-house is being erected at Chipping Norton; those at Henley and Deddington are now the only stations in the county requiring improvement. Nine ticket-of-leave men regularly reported themselves during the year. One changed his residence under the regulations, and two broke their condition of license; two were re-committed.

One superintendent; five 1st class, and 12 3d class constables received promotion during the year. A reserve is still much required. The force is efficient.

BOROUGH of BANBURY.

Strength of Force - - - 5.

Borough of Banbury.

Population, 1861 - - - -	4,055	Population to one constable - -	811
Area in acres - - - -	105	Area to one constable - - -	17¼

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.	
	Head Constable.	Inspector.	Serjeants.	Constables.
Number and Classes - - - -	1	- -	1	3
Rates of Pay - - - - -	£. 70	- -	21 *s.*	18 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	17	17	17	32	32	—
1861–62 - -	18	16	14	28	16	6
1862–63 - -	18	14	14	28	23	3
1863–64 - -	13	*15	15	46	19	17
1864–65 - -	7	6	6	46	21	11

	Number of.	Proceeded against.	Fined.
Public Houses - - - - and	38	—	—
Beer Houses - - - - -	19	—	—

* Some double cases.

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Extra Duties performed by the Police.—Nil.

One constable resigned during the year. Three known thieves, and only one suspected person, are reported to reside within the borough. The cells are improved and in good order. Two ticket-of-leave men changed their residence under the regulation during the year, and one was re-committed. I last year reported, that although the number of drunk and disorderly persons was 46 out of 38 public-houses and 19 beerhouses, none had been proceeded against; and this year I find, again, 46 persons proceeded against as drunk and disorderly, of whom 21 were fined and 11 actually committed to gaol; and yet, out of the 38 public-houses and 19 beerhouses again this year, none have been proceeded against; so that in two years 92 persons have been proceeded against as drunk and disorderly, and no public or beerhouse has been proceeded against during that period. All I can say of this force is, that in number of constables it is efficient.

CITY of OXFORD.

City of Oxford.

Strength of Force - - - - - 12.

Population, 1861 - - - - 28,261
Area, about four miles.

Population to one constable - - 2,355
Area to one constable, one-third of a mile.

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.		
	Head Constable.	Serjeants.	Constables.	
Number and Classes - - - -	1	2	8	1
Rates of Pay - - - - -	£. 80	22 *s.*	18 *s.*	15 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	64	36	28	29	27	—
1861–62 -	42	24	23	26	10	14
1862–63 -	62	37	37	15	11	3
1863–64 -	39	26	23	16	11	4
1864–65 -	34	22	18	15	6	9

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	152	1	1
and			
Beer Houses - - - - -	98	2	2

Extra Duties performed by the Police.—Nil.

One constable resigned during the year. Twenty-three known thieves and 35 suspected persons are reported to reside within the city. The lock-up is kept clean. I have nothing further to report as to this force; it remains inefficient in number and discipline, and can only be made efficient by a thorough re-construction by co-operation with the university or county force. Fees are received by the constables, and this is the only force in the district where no superannuation fund has yet been established.

The force is inefficient.

COUNTY of RUTLAND.

County of Rutland.

Strength of Force - - - - - - 8.

Population, 1861 - - -	21,867	Population to one constable -	2,733
Area in acres - - - -	104,568	Area to one constable - -	13,071

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.		
	Chief Constable.	Superintendents.	Inspectors.	Serjeants.	Constables.	
Number and Classes - - - -	1	- -	1	1	4	1
Rates and Pay - - - - -	£. 250	- -	£. 65	s. 23	s. 21	s. 19

The chief constable has no allowance for travelling expenses.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	26	15	12	22	16	—
1861–62 - -	14	14	14	27	15	5
1862–63 - -	9	7	5	40	21	5
1863–64 - -	18	21	17	40	18	6
1864–65 - -	* 9	13	9	33	25	3

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	78	2	2
and			
Beer Houses - - - - - -	68	5	3

* Four persons were committed for two cases.

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, and high constables.

Two constables resigned and one was dismissed during the year. Twelve known thieves and 25 suspected persons are reported to reside within the county. The station-house is in good order. Two ticket-of-leave men reported themselves regularly during the year. A station-house is much required at Uppingham, but there has been some difficulty in obtaining a site; it will, however, I have reason to believe, be erected as soon as this difficulty is overcome, and it will add much to the advantage of the force. The force is efficient.

COUNTY of SALOP, with the BOROUGHS of WENLOCK and OSWESTRY.

County of Salop, with the Boroughs of Wenlock and Oswestry.

Strength of Force - - - - - - 116.

Population, 1861 - - -	217,379	Population to one constable -	1,873
Area in acres - - - -	842,928	Area to one constable - -	7,264

RANKS.	Yearly Pay in £.					Weekly Pay in Shillings.			
	Chief Constable.	Superintendents.			Inspector.	Serjeants.		Constables.	
Number and Classes - -	1	1	1	4	1	9	6	28	65
Rates of Pay - - - -	£. 300	£. 120	£. 100	£. 90	£. 70	s. 23	s. 22	s. 21	s. 19

Chief constable's allowance for travelling expenses, 100 *l.* per annum; the superintendents are allowed 39 *l.* per annum to provide horses and keep.

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	310	223	181	818	650	73
1861-62 - -	318	216	190	893	771	86
1862-63 - -	342	263	234	1,004	770	73
1863-64 - -	294	235	219	1,075	887	107
1864-65 - -	287	235	214	1,374	1,128	88

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - - -	726	31	1	18
and Beer Houses - - - - - -	426	39	- -	31

Extra Duties performed by the Police.—Inspector of common lodging-houses and inspector of nuisances.

Sixteen constables resigned and three were dismissed during the year. 162 known thieves and 193 suspected persons are reported to reside within the county. A new station-house at Market Drayton is in the course of erection, and that at Newport is being enlarged and improved. Seven ticket-of-leave men have reported themselves regularly during the year, three have changed their residence under the regulation, two have broken their condition of license, and two have been re-committed. This force has received an increase of seven constables, which was much required, particularly in the Wellington district; it remains still one of the weakest English forces in this district. The superintendents remain without carts, having 39 *l.* each for horses and keep. According to my experience I must add, that the addition of carts would be both a saving and a great addition to the well-working of the force. The force is efficient.

Borough of Bridgnorth.

Borough of Bridgnorth.

Strength of Force - - - - - - 2.

Population, 1861 - - - -	6,086	Population to one constable - -	3,043
Area in acres - - - -	2,987	Area to one constable - - -	1,493

Ranks.	Yearly Pay in £.	Weekly Pay in Shillings.
	Head Constable.	Constable.
Number and Classes - - -	1	1
Rates of Pay - - - -	£. 65	20 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	24	11	5	61	52	—
1861-62 - -	17	12	8	54	46	1
1862-63 - -	4	3	2	50	43	2
1863-64 - -	7	6	4	91	90	—
1864-65 - -	8	5	3	36	32	—

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	51	2	2
and Beer Houses - - - - -	15	2	1

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, and inspector of nuisances.

Two constables resigned during the year, which is a change of the number of the whole force twice, there being only one constable besides the superintendent. Seven known thieves and 10 suspected persons are reported to reside within the borough.

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borough. The station-house is in good order. On my inspection I had an interview with the mayor, to whom I wrote, recommending that the force should be increased to one head constable, one serjeant, and three constables; but this proposal was rejected by the council, and consequently the force remains with an active head constable and one constable, and is both in weakness and discipline, inefficient.

Borough of Ludlow.

Borough of Ludlow.

Strength of Force - - - - - 5.

Population, 1861 - - - -	5,178	Population to one constable - -	1,035
Area in acres - - - -	280	Area to one constable - - -	56

Ranks.	Yearly Pay in £.	Weekly Pay in Shillings.	
	Head Constable.	Serjeant.	Constables.
Number and Classes - -	1	1	3
Rates of Pay - - - -	£. 70	20 *s.*	18 *s.*

Years.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	11	12	10	39	20	—
1861–62 - -	8	7	6	37	26	—
1862–63 - -	6	7	7	97	54	4
1863–64 - -	9	9	7	100	59	2
1864–65 - -	8	9	6	75	45	7

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	59	3	3
and			
Beer Houses - - - - -	4	—	—

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, inspectors of nuisances, and assistant relieving officer for casual poor, of whom 618 were relieved during the year, being 12 more than were relieved the previous year.

Two constables resigned during the year. Four known thieves and six suspected persons are reported to reside within the borough. The lock-up is kept clean and the cells in order. The present head constable was elected on the decease of the late head constable, during the year. The pay of the force continues too low to keep men in the service, although the constables' pay is now 18 *s.* per week, instead of 18 *s.* and 15 *s.* One ticket-of-leave man has reported himself regularly during the year.

The force is efficient.

Borough of Shrewsbury.

Borough of Shrewsbury.

Strength of Force - - - - - 23.

Population, 1861 - - - -	23,000	Population to one constable - -	1,000
Area in acres - - - -	5,600	Area to one constable - - -	243

Ranks.	Yearly Pay in £.	Weekly Pay in Shillings.			
	Head Constable.	Serjeants.	Constables.		
Number and Classes - -	1	3	4	6	9
Rates of Pay - - - -	£. 106	24 *s.*	21 *s.*	20 *s.*	18 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	52	45	31	235	165	—
1861-62 - -	32	22	21	240	150	42
1862-63 - -	48	32	32	219	158	18
1863-64 - -	43	31	21	261	180	26
1864-65 - -	42	34	21	207	138	14

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	157	10	7
and Beer Houses - - - - -	28	3	2

Extra Duties performed by the Police.—Inspector of weights and meansures.

One constable was dismissed, and four resigned during the year. Fourteen known thieves and 23 suspected persons are reported to reside within the borough. The station house is in good order. Five ticket-of-leave men have reported themselves regularly during the year. The understanding between the county and borough forces is not in a satisfactory state: but I have every reason to know that Colonel Cureton, the chief constable of the county, is most anxious to give every assistance in his power to remove any difficulties which may have heretofore existed seriously affecting the thorough co-operation between the two forces which is so necessary for their complete efficiency; all, therefore, that is required is a reciprocity of action on the part of the borough authorities.

The force is efficient.

COUNTY of STAFFORD, with STAFFORD and TAMWORTH BOROUGHS.

County of Stafford, with Stafford and Tamworth Boroughs.

Strength of Force - - - - - 421.

Population, 1861 - - -	630,829	Population to one constable - -	1,498
Area in acres - - - -	706,463	Area to one constable - - -	1,678

RANKS.	Yearly Pay in £.						Weekly Pay in Shillings.						
	Chief Constable.	Superintendents.			Inspectors.		Serjeants.			Constables.			
Number and Classes	1	3	8	2	6	5	32	11	10	167	100	69	7
Rates of Pay - -	£. 500	£. 145	£. 109	£. 100	£. 80	£. 70	s. 25	s. 24	s. 23	s. 21	s. 20	s. 19	s. 17

The chief constable has 150 *l.* per annum for travelling expenses; and the superintendents receive 50 *l.* per annum for wear and tear and keep of horse.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	1,156	774	553	2,689	2,187	—
1861-62 - -	1,167	775	562	2,932	2,187	222
1862-63 - -	902	731	547	2,927	2,205	248
1863-64 - -	943	743	542	3,306	2,397	259
1864-65 - -	937	748	551	2,714	1,847	259

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	2,036	130	4	103
and Beer Houses - - - - -	2,254	416	- -	368

Extra Duties performed by the Police.—Inspectors of nuisances, inspectors of common lodging-houses, and high constables. Assistant relieving officers for casual poor, of whom in the unions of Rugeley, Stafford, Stoke-upon-Trent, Uttoxeter, and West Bromwich, 10,868 were relieved during the year, being an increase of 411 over the number relieved in those unions the previous year.

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Eastern Counties, Midland, and North Wales District.

Forty-six constables resigned, and 17 were dismissed during the year. 866 known thieves and 1,359 suspected persons are reported to reside within the county and boroughs of Stafford and Tamworth. The station-houses are in good order; a new and commodious station has been built at Tipton, and that at Brierly Hill has been ordered to be enlarged and improved. Thirty-two ticket-of-leave men have regularly reported themselves during the year; seven changed their residence under the regulation; five broke their condition of license, and two have been re-committed. I found, on inspection, the force in its usual good order, but there had been many changes, and the recruiting was slack in consequence of the great difficulty in obtaining men likely to make efficient officers on account of the lowness of pay, and high price of labour in the county.

The force is efficient.

City of Lichfield.

City of Lichfield.

Strength of Force - - - - - 6.

Population, 1861 - - - -	6,893	Population to one constable - -	1,149
Area in acres - - - -	3,231	Area to one constable - - -	538

Ranks.	Yearly Pay in £.		Weekly Pay in Shillings.		
	Head Constable.	Inspectors.	Serjeants.	Constables.	
Number and Classes -	1	- -	1	1	3
Rates of Pay - -	£. 62	- -	21 s.	20 s.	18 s.

Years.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	18	16	13	34	26	—
1861–62 - -	22	19	9	29	25	—
1862–63 - -	8	10	7	62	48	—
1863–64 - -	6	6	6	101	80	—
1864–65 - -	8	5	3	92	73	8

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	66	3	2
and			
Beer Houses - - - - -	4	—	—

No extra duties are performed by the police; one constable resigned, and one was dismissed during the year. Seven known thieves and nine suspected persons are reported to reside within the city. The cells, although not of the first class, have been improved. Two ticket-of-leave men reported themselves regularly during the year, and one changed his residence according to regulation. Two constables left the force during the year, which might be expected, as the scale of pay is the lowest in the whole district, and it cannot be supposed that good men will remain under such circumstances; the force has its proper number of constables, and is efficient.

Borough of Newcastle-under-Lyme.

Borough of Newcastle-under-Lyme.

Strength of Force - - - - - - - - - - - 12.

Population, 1861 - - -	12,638	Population to one constable - -	1,053
Area in acres - - - -	640	Area to one constable - - -	53

Ranks.	Yearly Pay in £.		Weekly Pay in Shillings.			
	Head Constable.	Inspectors.	Serjeants.	Constables.		
Number and Classes -	1	- -	2	2	3	4
Rates of Pay - -	£. 90	- -	21 s.	20 s.	19 s.	16 s.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	23	17	16	144	129	—
1861–62 -	24	19	15	150	136	8
1862–63 -	18	14	12	101	81	11
1863–64 -	19	13	12	166	144	13
1864–65 -	29	25	22	132	109	18

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	63	5	5
and			
Beer Houses - - - - -	48	8	6

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, inspectors of nuisances, and assistant relieving officers for casual poor, of whom 1,781 were relieved during the year, the police not having relieved vagrants the whole of the year.

Five known thieves and 13 suspected persons are reported to reside within the borough. The station-house and cells are kept clean, although not of the best description. Two ticket-of-leave men reported themselves regularly during the year. This force has now been increased to its full complement of men, and the classification is under the consideration of the Council. From the attention which is now paid to the subject, I have every reason to believe the force will become efficient in number and discipline, which, up to the 29th of September, could not be reported to be the case, as, although well supervised, it was too weak in number; and therefore, for last year, must be reported inefficient.

BOROUGH OF WALSALL.

Borough of Walsall.

Strength of Force - - - - - - - 30.

Population, 1861 - - - -	37,762	Population to one constable - -	1,258
Area in acres - - - -	8,000	Area to one constable - - -	266

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.							
	Head Constable.	Inspectors.	Serjeants.			Constables.				
Number and Classes - -	1	- -	1	4	1	2	1	8	8	4
Rates of Pay - - -	£. 185	- -	s. d. 26 6	s. 24	s. d. 23 6	s. 21	s. 20	s. 19	s. 18	s. 17

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	34	23	19	107	55	10
1861–62 -	42	28	24	158	106	2
1862–63 -	57	42	33	128	54	10
1863–64 -	37	24	19	140	82	2
1864–65 -	68	33	32	131	81	3

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	174	24	15
and			
Beer Houses - - - - -	126	17	15

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, and inspectors of nuisances.

Two constables were discharged, and eight resigned during the year. Seventy-seven known thieves, and 129 suspected persons are reported to reside within the borough. The old station-house has been pulled down, and a temporary station with cells taken, until the new cells are completed. Eight ticket-of-leave of-leave men reported themselves regularly during the year, and three were re-committed. This force continues to change largely, although the pay is on a fair average scale, and every encouragement is given by the watch committee to the constables to remain; but from all I could learn on my inspection, the cause of resignation was the increase of pay the men received from other employment. So constant a change is much to be regretted as a serious drawback to any force; the new constables, however, appeared promising, and likely to remain, and I have therefore to report the force, in number and discipline, efficient.

BOROUGH of WOLVERHAMPTON.

Borough of Wolverhampton.

Strength of Force - - - - 68.

Population, 1861 - - -	60,858	Population to one constable - -	895
Area in acres - - - -	3,440	Area to one constable - - -	50

RANKS.	Yearly Pay in £.				Weekly Pay in Shillings.							
	Head Constable.	Inspectors.			Serjeants.		Constables.					
Number and Classes -	1	1	4	1	4	4	3	14	8	16	8	4
Rates of Pay - -	£. 350	£. 93	£. 80	£. 72	s. 24	s. 23	s. 22	s. 21	s. 20	s. 19	s. 18	s. 17

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	331	188	73	426	381	—
1861-62 - -	105	78	42	437	337	65
1862-63 - -	127	105	73	365	254	52
1863-64 - -	58	54	46	385	234	59
1864-65 - -	157	151	123	416	242	68

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	215	16	12
and Beer Houses - - - - -	224	38	28

Extra Duties performed by the Police.—Inspector of weights and measures and inspector of common lodging-houses.

Twelve constables resigned and 12 were dismissed during the year. 223 known thieves and 223 suspected persons are reported to reside within the borough. The station-house has been often reported to be very inferior, and each year I am told that a new station will be built. All I can add is, that it is much required. Twelve ticket-of-leave men reported themselves regularly during the year, and two broke their condition of license. The force is in much the same high state of efficiency as last year. One additional inspector has been appointed, and some promotion has taken place in the first and second class of constables. The best understanding exists between this and the neighbouring forces, and the force is efficient.

COUNTY of SUFFOLK (EAST), with BECCLES, EYE, and ORFORD BOROUGHS.

County of Suffolk (East), with Beccles, Eye, and Orford Boroughs.

Strength of Force - - - - 114.

Population, 1861 - - -	179,213	Population to one constable - -	1,572
Area in acres - - -	589,212	Area to one constable - - -	5,168

RANKS.	Yearly Pay in £.					Weekly Pay in Shillings.					
	Chief Constable.	Superintendents.		Inspectors.		Serjeants.	Constables.				
Number and Classes - -	1	2	4	4	5	6	30	10	24	12	16
Rates of Pay - - -	£. 300	£. 110	£. 100	£. 70	£. 65	s. 23	s. 21	s. 20	s. 19	s. 17	s. 16

Chief constable's allowance for travelling, 70 *l.* per annum; superintendents', for horses, wear and tear and keep, 50 *l.* per annum.

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	203	125	90	141	98	11
1861–62 - -	152	125	107	194	157	16
1862–63 - -	145	107	86	177	131	28
1863–64 - -	138	100	83	166	119	16
1864–65 - -	146	112	88	196	144	16

	Number of.	Proceeded against.	Deprived of License.	Committed.
Public Houses - - - -	490	5	1	4
and				
Beer Houses - - - - -	216	14	- -	13

Extra Duties performed by the Police.—Inspectors of weights and measures, inspectors of common lodging-houses, and assistant relieving officer for casual poor, of whom 759 were relieved during the year, being a decrease of 524 from the number relieved the previous year. This is much to be accounted for by the arrangement made in the Wickam Market Union as to conveying applicants to the workhouse instead of giving them tickets on lodging houses, which system I have alluded to in my general report.

Eleven constables resigned during the year. Eighty known thieves and 232 suspected persons are reported to reside within this district of the county and the consolidated boroughs. The station-house at Halesworth is finished and that at Bungay improved; four ticket-of-leave men have regularly reported themselves during the year, and one has been re-committed; some difficulties having arisen as to the residence of the chief constable, I inquired into the subject, and was given to understand that it would be changed, according to the wish of the magistrates. I particularly examined the diaries of the force, which appeared to me to be very well kept; occasionally, however, finding no entry as to attending divine service, a point I invariably find properly entered in all county forces. The force is efficient.

BOROUGH of IPSWICH.

Strength of Force - - - - - - 37.

Borough of Ipswich.

Population, 1861 - - -	37,[illegible]19	Population to one constable - -	1,047
Area in acres - - - -	8,450	Area to one constable - - -	238

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.			
	Head Constable.	Inspectors.	Serjeants.	Constables.		
Number and Classes - -	1	- -	5	14	7	10
Rates of Pay - - - -	£. 130	- -	24 s.	21 s.	19 s.	17 s.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	216	131	69	95	26	—
1861–62 - -	166	99	50	141	46	8
1862–63 - -	90	68	46	103	21	4
1863–64 - -	113	49	37	112	28	4
1864–65 - -	105	43	33	64	10	1

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	139	2	2
and			
Beer Houses - - - - -	134	5	2

There

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

There are no extra duties performed by the police, with the exception of assistant relieving officer for casual poor, of whom 829 were relieved during the year, being a decrease of 74 from the number relieved the previous year.

Five constables resigned, five were dismissed, and two died during the year, making a change of one-third of the force; 25 known thieves and 27 suspected persons are reported to reside within the borough. The station-house and cells are in good order. One ticket-of-leave man has regularly reported himself during the year, one has changed his residence under the regulation, and one has broken the condition of his license.

The force is efficient.

Borough of
Southwold.

Borough of Southwold.

No Return received.—Inefficient.

County of Suffolk (West), with Bury St. Edmund's Borough.

Strength of Force - - - - 89.

County of Suffolk
(West), with Bury
St. Edmunds (Borough).

Population, 1861 - - - -	113,418	Population to one constable - -	1,274
Area in acres - - - -	353,215	Area to one constable - - -	3,968

RANKS.	Yearly Pay in £.				Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.	Inspectors.		Serjeants.	Constables.			
Number and Classes -	1	5	1	9	3	22	7	31	10
Rates of Pay - -	£. 420	£. 115	£. 85	£. 70	23 s.	21 s.	20 s.	19 s.	17 s.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed fos the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	205	110	100	100	66	—
1861–62 - -	153	119	83	138	92	34
1862–63 - -	144	120	99	155	100	33
1863–64 - -	134	100	90	130	117	27
1864–65 - -	136	92	74	185	129	36

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	337	6	5
and Beer Houses - - - - -	247	14	10

Chief constable's allowance for travelling, 50 *l.* Superintendents allowed 46 *l.* per annum to find and keep horses.

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, and assistant relieving officer for casual poor, of whom 648 were relieved during the year, being a decrease of 76 from the number relieved the previous year.

Seven constables resigned, and two were dismissed during the year: 113 known thieves and 134 suspected persons are reported to reside within the county and borough of Bury St. Edmund's. The station-houses are all in order. Two ticket-of-leave men reported themselves regularly during the year, and one changed his residence under the regulation. The only change in this force is the addition of one constable.

The force is efficient.

Borough of Sudbury.

Strength of Force - - - - 6.

Borough of Sudbury.

Population, 1861 - - - -	6,879	Population to one constable - -	1,146
Area in acres - - - - -	1,968	Area to one constable - - -	328

Ranks.	Yearly Pay in £.		Weekly Pay in Shillings.		
	Head Constable.	Inspectors.	Serjeant.	Constables.	
Number and Classes - -	1	- -	1	3	1
Rates of Pay - - - -	£. 88	- -	23 *s.*	21 *s.*	17 *s.*

Years.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	14	6	5	8	8	—
1861–62 - -	7	6	6	13	8	—
1862–63 - -	7	6	3	14	8	—
1863–64 - -	10	7	4	10	5	3
1864–65 - -	12	11	8	9	4	—

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	19	—	—
and Beer Houses - - - - -	20	—	—

Extra Duties performed by the Police.—Inspector of common lodging-houses, and assistant relieving officer of casual poor, of whom 248 were relieved during the year, being an increase of one over the number relieved the previous year.

There have been no dismissals or resignations. Five known thieves and 18 suspected persons are reported to reside within the borough. The cells are in fair order. One ticket-of-leave man has regularly reported himself during the year. The force, in class and pay, is precisely the same as last year.

The force is efficient.

County of Warwick.

Strength of Force - - - - 171.

County of Warwick.

Population, 1861 - - - -	193,123	Population to one constable - -	1,129
Area in acres - - - -	546,665	Area to one constable - -	3,234

Ranks.	Yearly Pay in £.							Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.				Inspectors.		Serjeants.	Constables.			
Number and Classes -	1	1	1	2	1	2	9	15	20	38	56	25
Rates of Pay - -	£. 350	£. 110	£. 100	£. 95	£. 90	£. 80	£. 75	*s.* 23	*s.* 21	*s.* 20	*s.* 19	*s.* 17

The chief constable is allowed 150 *l.* per annum for travelling expenses, and the superintendents' horses average 45 *l.* per annum.

No. 1.
Eastern Counties,
Midland,
and North Wales
District.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	276	150	131	347	254	—
1861-62 - -	326	183	153	377	280	47
1862-63 - -	269	161	141	402	263	49
1863-64 - -	275	202	159	410	301	47
1864-65 - -	285	205	152	408	307	49

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	780	18	7	18
and Beer Houses - - - - -	338	36	- -	34

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, and assistant relieving officer for casual poor, of whom 1,599 were relieved during the year, being an increase of 91 over the number relieved the previous year.

Twenty-two constables resigned and 15 were dismissed during the year; 170 known thieves and 378 suspected persons are reported to reside within the county. The station-houses are all in good order, except Shipton-on-Stour, which requires improvement, and has been reported to the Court of Quarter Sessions. Seven ticket-of-leave men have regularly reported themselves during the year, and two have changed their residence under the regulation; one broke the condition of his license. The force remains the same in number as last year, but it has received a great share of promotion, particularly from the second and third to the first class. The number of resignations and dismissals is high; but in this county there is so much employment at high wages, a great difficulty exists in obtaining the right sort of recruit, consequently the men either leave of their own accord, or are dismissed as unfit for the service after a short period of probation.

The force is efficient.

BOROUGH of BIRMINGHAM.

Strength of Force - - - - 377.

Borough of
Birmingham.

Population, 1861 - - -	295,955	Population to one constable - -	785
Area in açres - - - -	8,420	Area to one constable - - -	22½

RANKS.	Yearly Pay in £.							Weekly Pay in Shillings.						
	Head Constable.	Superintendents.		Inspectors.				Serjeants.		Constables.				
Number and Classes	1	5	1	1	1	2	11	15	33	5	193	15	29	65
Rates of Pay -	£. 450	£. 140	£. 130	£. 125	£. 109	£. 104	£. 80	s. 25	s. 24	s. 22	s. 20	s. 19	s. 18	s. 17

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	836	673	427	1,186	160	—
1861-62 -	863	738	473	1,266	163	173
1862-63 -	883	600	457	1,281	146	183
1863-64 -	752	598	431	1,373	190	175
1864-65 -	1,258	805	436	1,706	292	247

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	688	128	1	110
and Beer Houses - - - - -	1,081	340	- -	280

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The police do not undertake any extra duties. Twenty-five constables were dismissed and 90 resigned during the year, an increase of 21 constables who have left the force over the number reported to have done so last year, being 30 per cent. upon the whole force.

This high average of change, which has continued for some years in this force, must in a great degree arise from the low rates of pay which has been given, and which, consequently, did not encourage the proper class of recruits to enter the service; this, however, has been remedied by a vote of increase of pay to all the ranks, which is to take place in January next, and will, I have no doubt, produce a beneficial effect in bringing a better class of men, and of keeping those constables who have become of value to the force by their period of service and knowledge of their duties; notwithstanding the great change alluded to, the force maintains its efficiency, although weak as to the population and houses, which are greatly on the increase; an addition to the force will, I trust, soon be voted, so as to complete the force to 400 men. Nine hundred and twelve known thieves and 591 suspected persons are reported to reside within the borough. The station-houses are all in good order. Sixty-eight ticket-of-leave men have regularly reported themselves during the year, and 17 have changed their residence under the regulation. Thirty-one have broken their condition of license, and nine have been re-committed. In the criminal return there is an increase in the number of indictable offences reported during the year, which is to be accounted for by the last year's returns not having included all the cases reported over 5 *s.* value. The present returns have been carefully investigated, and appear correct. In the return of drunk and disorderly persons there is a great increase in the number proceeded against and in the number of persons committed. The public-houses and beer-houses appear to have been largely proceeded against; and the police appear to have well performed their duty in this respect by the proportion of those proceeded against having been convicted.

The force is efficient.

City of Coventry.

City of Coventry.

Strength of Force - - - - 37.

Population, 1861 - - -	40,937	Population to one constable - -	1,106
Area in acres - - - -	1,660	Area to one constable - - -	44

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.				
	Head Constable.	Inspectors.	Serjeants.	Constables.			
Number and Classes	1	3	4	3	8	9	9
Rates of Pay - -	£. 149	£. 65	s. 23	s. 21	s. 20	s. 19	s. 17

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	27	24	12	112	9	—
1861-62 -	34	32	23	177	18	26
1862-63 -	73	66	27	108	12	2
1863-64 -	59	25	18	150	22	15
1864-65 -	58	49	39	167	26	15

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	251	8	7
and Beer Houses - - - - -	1	—	—

Extra Duties performed by the Police.—Inspectors of weights and measures, and assistant relieving officers for casual poor, of whom 3,243 were relieved during the year, being an increase of 234 over the number relieved during the previous year.

One constable resigned and four were dismissed during the year. Nine

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known thieves and 47 suspected persons are reported to reside within the city. The station-house is in excellent order. Four ticket-of-leave men have regularly reported themselves during the year; one has changed his residence under the regulation, one has broken his condition of license, and one has been recommitted. The pay of the whole force has lately been increased, including the head constable, whose services, I believe to be well worthy of it.

The force in number and discipline is efficient.

TOWN of LEAMINGTON.

Strength of Force, - - - - 21.

Town of Leamington.

Population, 1861 - - -	17,452	Population to one constable - -	831
Area in acres - - - -	1,571	Area to one constable - - -	74

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.				
	Head Constable.	Inspectors.		Serjeants.	Constables.			
Number and Classes - - -	1	1	1	2	5	4	4	3
Rates of Pay - - - -	£. 250	£. 95	£. 80	s. 25	s. 22	s. 21	s. 20	s. d. 18 6

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	23	24	16	20	4	—
1861-62 -	37	34	31	46	8	4
1862-63 -	34	32	23	33	4	5
1863-64 -	19	16	16	54	15	7
1864-65 -	21	16	14	49	40	4

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	82	5	5
and Beer Houses - - - - -	7	3	3

The only extra duty performed by the police is inspector of nuisances. Two constables were dismissed during the year. Twenty-three known thieves and 27 suspected persons are reported to reside within the town. The station-house and cells are in good order and kept very clean, although not well adapted for police purposes. Two ticket-of-leave men have regularly reported themselves during the year and one has changed his residence under the regulation. The pay of this force throughout all ranks has been increased, and it is only a measure of justice to the force for the manner in which they perform their duties. In a pleasure town, I always consider extra duties must be imposed upon the police from the constant change of population, and the variety of property to be protected. For the execution of such duties I consider Leamington to be well provided.

The force is efficient.

BOROUGH of STRATFORD-UPON-AVON.

Strength of Force - - - - 4.

Borough of Stratford-upon-Avon.

Population, 1861 - - - -	3,672	Population to one constable - -	918
Area in acres - - - -	108	Area to one constable - - -	27

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.	
	Head Constable.	Serjeants.	Constables.
Number and Classes - - -	1	1	2
Rates of Pay - - - -	£. 65	21 s.	19 s.

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	7	4	4	13	7	—
1861–62 -	11	11	11	15	6	—
1862–63 -	11	9	7	16	9	—
1863–64 -	7	7	7	24	11	8
1864–65 -	2	2	2	17	4	8

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	34	1	1
and Beer Houses - - - - -	4	—	—

The head constable acts as assistant relieving officer for casual poor, of whom 360 were relieved during the year, being an increase of 160 over the number relieved the previous year. One constable resigned during the year. Three known thieves and 10 suspected persons are reported to reside within the borough. Two ticket-of-leave men reported themselves regularly during the year. The new cells, lately erected near the town hall, are now occupied by borough prisoners.

The force is, in numbers and discipline, efficient.

BOROUGH OF WARWICK.

Strength of Force - - - - 11.

Borough of Warwick.

Population, 1861 - - -	10,589	Population to one constable - -	962
Area in acres - - - -	24,808	Area to one constable - - -	2,255

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.			
	Head Constable.	Serjeants.	Constables.		
Number and Classes - - -	1	2	1	4	3
Rates of Pay - - - - -	£. 70	23 *s.*	21 *s.*	20 *s.*	18 *s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	37	26	21	79	19	—
1861–62 -	48	39	29	77	18	8
1862–63 -	29	36	23	63	8	2
1863–64 -	23	18	10	66	17	8
1864–65 -	25	19	14	68	20	1

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	63	2	—
and Beer Houses - - - - -	12	1	1

Extra Duties performed by the Police.—Inspector of weights and measures, inspector of common lodging-houses, and inspector of nuisances.

Two constables resigned during the year. Five known thieves and six suspected persons are reported to reside within the borough. The station-house and cells are kept clean and in order. One ticket-of-leave man has regularly reported himself during the year and one has changed his residence under the regulation. The most remarkable feature in this force is the very large area to one constable, namely, 2,255 acres; notwithstanding this great extent to watch, I have every reason to believe the force to be working well, keeping its points with neighbouring forces, and to be efficient.

County of Worcester, with the Boroughs of Dudley and Evesham.

COUNTY of WORCESTER, with the BOROUGHS of DUDLEY and EVESHAM.

Strength of Force - - - - 176.

Population, 1861 - - -	249,154	Population to one constable - -	1,415
Area in acres - - - -	431,553	Area to one constable - - -	2,452

RANKS.	Yearly Pay in £.							Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.						Serjeants.	Constables.			
Number and Classes -	1	1	1	2	4	2	1	19	51	51	35	8
Rates of Pay - -	£. 300	£. 150	£. 120	£. 110	£. 100	£. 90	£. 80	s. 23	s. 21	s. 20	s. 19	s. 17

The chief constable is allowed 150 *l.* per annum for his travelling expenses, and the superintendents are allowed 40 *l.* per annum for wear and tear and keep of horses.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	611	431	312	476	255	—
1861-62 -	628	465	342	582	311	81
1862-63 -	513	385	301	451	282	51
1863-64 -	459	353	276	518	299	50
1864-65 -	440	352	264	522	376	50

	Number of.	Proceeded against.	Deprived of Licence.	Fined.
Public Houses - - - - and	1,013	49	1	31
Beer Houses - - - - -	596	61	- -	48

Extra Duties performed by the Police.—Inspectors of weights and measures, common lodging-houses, and nuisances.

High constables in two unions; assistant relieving officers for casual poor, of whom 9,983 were relieved during the year, being 530 less than the number relieved during the previous year. Fourteen constables resigned and 13 were dismissed during the year. Two hundred and seventy-five known thieves and 424 suspected persons are reported to reside within the county and consolidated boroughs. The station-houses are all in a satisfactory state; a new first class station is in course of erection at Pershore. Fifteen ticket-of-leave men reported themselves regularly during the year, four changed their residences under the regulation, and four broke the condition of their license. An addition to the pay of the constables commenced from the 1st of January 1865; and at the Epiphany Sessions it was resolved to increase the force by eight constables, as a reserve. The borough of Dudley has consolidated with the county, and every thing appeared in good order.

The force is efficient.

BOROUGH of BEWDLEY.

Borough of Bewdley.

Strength of Force - - - - 2.

Population, 1861 - - - -	3,071	Population to one constable -	1,535
Area in acres - - - -	2,730	Area to one constable - -	1,365

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.
	Head Constable.	Constable.
Number and Classes - - -	1	1
Rates of Pay - - - - -	£.52	15*s.*

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	9	5	2	9	7	—
1861–62 -	6	3	2	12	3	4
1862–63 -	19	7	3	9	6	1
1863–64 -	5	3	3	17	7	—
1864–65 -	5	- - -	- - -	12	10	—

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	27	—	—
and Beer Houses - - - - -	14	1	1

The head constable acts as assistant relieving officer for casual poor, of whom 34 were relieved during the year, being three less than were relieved during the previous year. One known thief, two suspected persons, and two ticket-of-leave men are reported to reside within the borough. The cells are in the same state as last reported, being objectionable on account of the distance from the constable's residence; the two constables receive a low scale of pay—the head constable 52 *l.*, and the other constable only 15 *l.* per annum; and the force remains, as hitherto reported, inefficient.

Borough of Droitwich.

Strength of Force - - - - 2.

Borough of
Droitwich.

Population, 1861 - - - -	3,123	Population to one constable - -	1,561
Area in acres - - - -	1,645	Area to one constable - - -	822

Ranks.	Yearly Pay in £.	Weekly Pay in Shillings.
	Head Constable.	Constable.
Number and Classes - - -	1	1
Rates of Pay - - - - -	£.62	20*s.*

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	13	10	5	16	9	—
1861–62 -	6	4	- - -	13	4	—
1862–63 -	7	6	3	22	18	—
1863–64 -	7	5	3	24	16	—
1864–65 -	6	6	4	17	3	2

	Number of.	Proceeded against.	Fined.
Public Houses - - - - -	17	2	2
and Beer Houses - - - - -	15	1	1

The head constable acts as inspector of weights and measures, and common lodging-houses. Eleven known thieves and nine suspected persons are reported to reside within the borough. The cells are in good order. Two ticket-of-leave men reported themselves regularly during the year. The force is composed of the same active head constable and constable, but is as to number inefficient.

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and North Wales
District.

BOROUGH of KIDDERMINSTER.

Strength of Force - - - - 16.

Borough of Kidderminster.

Population, 1861 - - - 15,399 | Population to one constable - - 962
Area in acres - - - - 994 | Area to one constable - - - 62

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.			
	Head Constable,	Serjeants.	Constables.		
Number and Classes - - -	1	2	6	5	2
Rates of Pay - - - - -	£.100	22s.	19s.	18s.	17s.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	32	23	14	26	17	—
1861–62 -	34	28	19	53	29	5
1862–63 -	17	19	14	45	19	26
1863–64 -	10	7	5	71	21	13
1864–65 -	27	27	16	59	24	3

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	93	3	3
and Beer Houses - - - - -	25	—	—

Extra Duties performed by the Police.—Inspectors of weights and measures, and assistant relieving officers for casual poor, of whom 1,556 were relieved during the year, being 451 less than the number relieved the previous year.

One constable resigned during the year. Seventeen known thieves and twenty-six suspected persons are reported to reside within the borough. The station-house is in excellent order. An improvement has been made to the entrance to the magistrates' room. Three ticket-of-leave men have regularly reported themselves during the year, and one has changed his residence under the regulation. The scale of pay remains the same as last reported.

The force is in number and discipline efficient.

CITY of WORCESTER.

Strength of Force - - - - 33.

City of Worcester.

Population, 1861 - - - - 32,000 | Population to one constable - - 970
Area in acres - - - - 965 | Area to one constable - - - 33

RANKS.	Yearly Pay in £.	Weekly Pay in Shillings.			
	Head Constable.	Serjeants.	Constables.		
Number and Classes - - -	1	5	13	10	4
Rates of Pay - - - -	£. 180	24	21	19s. 6d.	18s.

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	129	103	38	250	16	—
1861-62 -	132	92	57	320	90	25
1862-63 -	107	88	67	188	61	20
1863-64 -	100	76	63	256	100	22
1864-65 -	125	103	77	268	110	17

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	178	19	9
and Beer Houses - - - - - -	98	9	8

Extra Duties performed by the Police.—Assistant relieving officer for casual poor, of whom 4,377 were relieved during the year, being an increase of 412 over the number relieved the previous year.

Four constables were dismissed during the year, and three resigned, one from ill health, and one to take a situation in the county prison. Forty-two known thieves and 92 suspected persons are reported to reside within the city. The new station-house is in perfect order. Four ticket-of-leave men reported themselves regularly during the year, and three failed in the condition of their license. There is no limit to any class in this force. Six constables have been promoted to the first class during the year; two constables have been incapacitated from sickness, and have been since pensioned. The force is in good order, and both in number and discipline efficient.

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and North Wales
District.

NORTH WALES.

County of Anglesey, with Beaumaris.

Strength of Force - - - - 23.

County of Anglesey, with Beaumaris.

Population, 1861 - - -	54,609	Population to one constable - -	2,374
Area in acres - - - -	193,453	Area to one constable - - -	8,411

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.						
	Chief Constable.	Inspectors.		Serjeants.			Constables.			
Number and Classes -	1	1	1	2	2	1	2	9	3	1
Rates of Pay - -	£. 250	£. 80	£. 75	s. 24	s. 22	s. 21	s. 20	s. 19	s. 18	s. 17

The chief constable receives 60 *l.* per annum for travelling expenses; inspectors 40 *l.* for horse and cart per annum.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 - -	20	11	10	101	64	11
1861–62 - -	39	34	26	107	48	15
1862–63 - -	43	30	28	101	56	8
1863–64 - -	34	31	28	81	46	12
1864–65 - -	*50	56	49	60	10	14

* Eight persons committed for one offence.

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	271	6	- - -	6
and Beer Houses - - - - -	13	1	1	1

Extra Duties performed by the Police.—Inspectors of weights and measures, nuisances, and assistant relieving officers for casual poor, of whom 602 were relieved during the year, being an increase of 150 over the number relieved the previous year.

Two constables resigned and one was dismissed during the year. Twelve known thieves and 48 suspected persons are reported to reside within the island. The station-houses are all in order. One ticket-of-leave man has regularly reported himself during the year; one has changed his residence under the regulation; one has broken his condition of license, and one has been re-committed. The force is the same in number as last year, but there has been a large increase into the first class, which is very satisfactory. In the indictable offences, eight persons were included in one offence, that of oyster dredging, which should be taken into consideration as to the relative number of indictable offences committed and detected. The force is efficient.

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and North Wales
District.

County of Carnarvon, with Bangor and Carnarvon Boroughs.

County of Carnarvon, with Bangor and Carnarvon Boroughs.

Strength of Force - - - - 55.

Population, 1861 - - - 92,776 | Population to one constable - - 1,686
Area in acres - - - - 367,995 | Area to one constable - - - 6,690

RANKS.	Yearly Pay in £.				Weekly Pay in Shillings.					
	Chief Constable.	Superintendents.		Inspectors.	Serjeants.	Constables.				
Number and Classes -	1	2	1	2	9	2	10	17	1	10
Rates of Pay - -	£. 250	£. 90	£. 80	£. 73	s. 24	s. 21	s. 20	s. 19	s. 18	s. d. 17 6

The chief constable is allowed 80 *l.* per annum for travelling expenses. The superintendents are allowed 44 *l.* for keep of horse.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	96	55	33	355	289	—
1861–62 -	97	47	23	455	327	41
1862–63 -	72	34	23	535	404	44
1863–64 -	112	63	44	480	370	34
1864–65 -	103	48	25	579	425	28

	Number of.	Proceeded against.	Fined.
Beer Houses - - - - - -	455	25	21
and			
Public Houses - - - -	47	20	15

Extra Duties performed by the Police.—Inspectors of weights and measures, nuisances, and assistant relieving officers for casual poor, of whom 1,950 were relieved during the year, being an increase of 289 over the number relieved the previous year, which is to be accounted for by the relief having been given only during this year by the police in one division.

Eleven constables resigned and three were dismissed during the year, which is a high average in the change of constables. Forty-six known thieves and 146 suspected persons are reported to reside within the county and consolidated boroughs. The station-houses are in order, but Nef-yn and Bettws-y-coed require improvement; that at Portmadock has been improved during the year. One ticket-of-leave man changed his residence under the regulation; the force has received a reinforcement of seven constables during the year. The number of indictable offences committed and detections is not satisfactory. The return of persons proceeded against as drunk and disorderly is high; the police, however, appear to have looked up the public houses and beer houses: of the latter I find there are 47, 20 having been proceeded against, and 15 fined; and of public houses 25 proceeded against, and 21 fined. The high rate of wages in this county acts very detrimentally to the force, as it is impossible to expect men to remain under discipline on lower wages than they can earn independently.

The force is efficient.

Borough of Pwllheli.

Borough of Pwllheli.

Strength of Force - - - - 1.

Population, 1861 - - - - 2,795 | Population to one constable - - 2,795
Area in acres - - - - - 1,000 | Area to one constable - - - 1,000

Ranks.	Yearly Pay in £.	Weekly Pay in Shillings.		
	Head Constable.	Inspectors.	Serjeants.	Constables.
Number and Classes -	—	—	—	—
Rates of Pay - -	—	—	—	—

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860–61 -	2	2	2	11	11	—
1861–62 -	2	2	2	16	14	—
1862–63 -	1	1	1	13	12	—
1863–64 -	2	2	2	13	13	—
1864–65 -	1	1	1	17	17	—

	Number of.	Proceeded against.	Fined.
Public Houses - - - -	32	4	4
and Beer Houses - - - - -	—	—	—

This force continues to be represented by one constable, and is now the only borough force in North Wales.

Inefficient.

COUNTY of DENBIGH, and BOROUGH of DENBIGH

Strength of Force - - - - 57.

County of
Denbigh, with
Denbigh Borough.

Population, 1861 - - -	104,316	Population to one constable - -	1,830
Area in acres - - - -	374,303	Area to one constable - - -	6,566

RANKS.	Yearly Pay in £.				Weekly Pay in Shillings.				
	Chief Constable.	Superintendents.	Inspectors.		Serjeants.		Constables.		
Number and Classes -	1	2	1	3	1	3	2	22	22
Rates of Pay - - -	£. 300	£. 100	£. 100	£. 75	s. 25	s. 23	s. 21	s. 20	s. 18

The chief constable receives 50 *l.* for travelling expenses, and the superintendents 50 *l.* each for wear and tear of a horse.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	53	45	38	232	162	27
1861-62 -	75	64	64	394	265	49
1862-63 -	68	70	59	337	227	21
1863-64 -	65	67	53	372	252	29
1864-65 -	87	80	71	400	260	40

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	444	10	2	9
and Beer Houses - - - - -	100	18	- - -	14

Extra Duties performed by the Police.—Inspectors of weights and measures, common lodging-houses, nuisances, and assistant relieving officers for casual poor, of whom 5,083 were relieved during the year, being 40 less than the number relieved the previous year.

Three constables resigned, and three were dismissed during the year. Twenty-nine known thieves and 71 suspected persons are reported to reside within the county. The station-house at Llansaintffraid has been erected. One ticket-of-leave man has regularly reported himself. Two have changed their residence under the regulation, and three have broken their condition of license. Two of the inspectors have received an increase of pay, to which they were fairly entitled. The force requires strengthening in the A division at Llangollen, by one constable; also in the B division, by two constables, one

to

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and North Wales
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to be at Denbigh, and one at Abergele. The 1st class in the B division is small and out of proportion to the number of 1st class in the A division.

The force is in good order, and efficient.

COUNTY of FLINT, with the BOROUGH of FLINT.

County of Flint, with the Borough of Flint.

Strength of Force - - - - 37.

Population, 1861 - - -	69,849	Population to one constable	-	1,887
Area in acres - - - -	185,264	Area to one constable	- -	5,007

RANKS.	Yearly Pay in £.				Weekly Pay in Shillings.	
	Chief Constable.	Superintendents.		Inspector.	Serjeants.	Constables.
Number and Classes -	1	2	1	1	3	29
Rates of Pay - - -	£. 250	£. 105	£. 75	£. 65	s. 23	s. 19

The chief constable receives 50 *l.* per annum for travelling expenses, and the superintendents 50 *l.* each per annum for wear and tear of horse.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 - -	36	37	25	290	239	–
1861-62 - -	51	30	17	396	306	40
1862-63 - -	45	37	31	364	298	23
1863-64 - -	62	64	50	404	345	34
1864-65 - -	67	59	44	550	472	45

	Number of.	Proceeded against.	Deprived of License.	Fined.
Beer Houses - - - - -	421	25	2	20
and Public Houses - - - - -	61	20	–	19

Extra Duties performed by the Police.—Inspectors of weights and measures, common lodging-houses, and assistant relieving officers for casual poor, of whom 2,038 were relieved during the year, being an increase of 448 over the number relieved the previous year.

Five constables resigned and one was dismissed during the year. Thirty-eight known thieves and 85 suspected persons are reported to reside within the county and borough of Flint. A good station-house has been erected at Saltney; that at Holywell remains unimproved. Eight ticket-of-leave men have reported themselves regularly during the year, and two have changed their residence under their regulation. The return of drunk and disorderly persons shows a large increase under that head: the public and beer houses have been largely proceeded against, and two public houses have been deprived of their license—a wholesome practice, but unfortunately rarely exercised.

The force is efficient.

COUNTY of MERIONETH.

County of Merioneth.

Strength of Force - - - - 24.

Population, 1861 - - -	38,888	Population to one constable	- -	1,690
Area in acres - - - -	383,581	Area to one constable	- -	16,677

RANKS.	Yearly Pay in £.		Weekly Pay in Shillings.	
	Chief Constable.	Inspector.	Serjeants.	Constables.
Number and Classes - -	1	1	4	18
Rates of Pay - - - -	£. 250	£. 70	23 *s.*	18 *s.*

The chief constable is allowed 50 *l.* per annum for travelling expenses, and the inspector 45 *l.* per annum for keep and wear and tear of horse.

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YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police.	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	19	16	13	65	50	—
1861-62 -	37	37	36	102	75	8
1862-63 -	26	29	26	93	62	13
1863-64 -	47	32	24	110	89	6
1864-65 -	37	43	34	138	101	21

	Number of	Proceeded against.	Fined.
Public Houses - - - - -	146	5	4
and Beer Houses - - - - -	9	4	3

Extra Duties performed by the Police.—Inspectors of weights and measures, nuisances, and assistant relieving officers for casual poor, of whom 2,282 were relieved during the year, being an increase of 505 over the number relieved the previous year.

Three constables resigned during the year. Six known thieves and 44 suspected persons are reported to reside within the county. A new station-house has been built at Dinas Towyn, and one is ordered to be erected at Festiniog, where it is much required; but this county has done more than an average as to the improvement in station-houses, and therefore it is only urgent cases that can be pressed upon it. No ticket-of-leave men are reported to have appeared in the county. There has been an increase of one constable during the year; the force otherwise is much in the same state as last year, working well and efficient.

County of Montgomery, with the Boroughs of Montgomery and Welchpool.

Strength of Force - - - - 29.

County of Montgomery, with the Boroughs of Montgomery and Welchpool.

Population, 1861 - - - -	66,919	Population to one constable - -	2,307
Area in acres - - - -	483,323	Area to one constable - - -	16,666

RANKS.	Yearly Pay in £.			Weekly Pay in Shillings.			
	Chief Constable.	Superintendent.	Inspector.	Serjeants.	Constables.		
Number and Classes - -	1	1	1	2	12	11	1
Rates of Pay - - -	£. 250	£. 95	£. 85	s. 23	s. 20	s. 18	s. 16

The chief constable receives 30 *l.* per annum for travelling expenses, and the inspector is allowed 36 *l.* annum for wear and tear and keep of horse.

YEARS.	Indictable Offences.			Drunk and Disorderly.		
	Reported to the Police	Persons Apprehended for the same.	Committed for the same.	Persons proceeded against.	Fined.	Committed.
1860-61 -	124	101	69	222	161	—
1861-62 -	137	133	105	250	162	23
1862-63 -	146	162	132	259	160	24
1863-64 -	116	129	107	296	209	11
1864-65 -	138	106	86	293	203	15

	Number of.	Proceeded against.	Deprived of License.	Fined.
Public Houses - - - -	257	12	2	12
and Beer Houses - - - - -	56	6	–	6

No. 1.

Eastern Counties, Midland, and North Wales District.

Extra Duties performed by the Police.—Inspectors of weights and measures, and inspectors of common lodging-houses.

One constable was dismissed during the year. Thirty-eight known thieves and 135 suspected persons are reported to reside within the county and boroughs. The want of a station-house at Llanfair remains as last reported. On my inspection I found the order of the court of quarter sessions, to enlarge the number of first class constables, had not been acted upon, through some misunderstanding of the chief constable as to whether the pay was to be advanced on promotion; but since that time it has been arranged, and an increase of two constables voted, which will be of great advantage to the force. One ticket-of-leave man reported himself, and changed his residence under the regulation. Under the head of public-houses, I find the valuable example made of two that were convicted by deprivation of license. The force is efficient.

APPENDIX.

No. 1 District.—Established Police Force, - - - -

COUNTIES and BOROUGHS.	Establishment.		DETAILS OF RANKS, 1865.						Population (Census 1861). 9.	Area in Acres. 10.	PROPORTIONS.	
	1864. 1.	1865. 2.	Chief Constables of Counties. 3.	Head Constables of Boroughs. 4.	Superintendents. 5.	Inspectors. 6.	Serjeants. 7.	Constables. 8.			Population to each Constable. 11.	Acres to each Constable. 12.
ENGLAND:												
Bedfordshire - - - -	82	85	1	–	7	–	10	67	121,805	281,211	1,433	3,308
Bedford - - - -	13	13	–	1	–	–	2	10	13,412	2,309	1,031	- -
Buckinghamshire - - - -	120	124	1	–	6	11	7	99	160,022	461,980	1,290	3,725
Buckingham - - -	4	4	–	1	–	–	–	3	3,847	4,777	961	- -
Chipping Wycombe - -	3	*3	–	1	–	–	–	2	4,222	120	1,407	- -
Cambridgeshire - - - -	70	70	1	–	4	4	4	57	85,256	290,213	1,218	4,146
Cambridge - - - -	34	34	–	1	–	1	4	28	26,351	3,470	775	- -
Isle of Ely - - - -	52	52	1	–	4	2	6	39	55,319	221,029	1,063	4,250
Wisbeach - - - -	11	11	–	1	–	–	3	7	9,218	6,429	838	- -
Derbyshire - - - - -	161	161	1	–	15	11	34	100	286,400	623,992	1,801	3,876
Chesterfield - - - -	11	11	–	1	–	1	1	8	9,835	450	894	- -
Derby - - - -	43	43	–	1	–	3	7	32	43,081	1,660	1,002	- -
Essex, with Harwich and Saffron Walden - - - - -	246	256	1	–	10	13	11	221	291,924	984,633	1,140	3,846
Colchester - - - -	22	22	–	1	–	–	3	18	23,730	11,770	1,078	- -
Maldon - - - -	2	2	–	1	–	–	–	1	4,747	3,508	2,373	- -
Hertfordshire - - - -	92	92	1	–	4	9	–	78	141,209	368,810	1,534	4,008
St. Alban's - - - -	7	7	–	1	–	–	2	4	7,675	434	1,096	- -
Hertford - - - -	6	6	–	1	–	–	1	4	6,769	3,350	1,128	- -
Huntingdonshire, with Godmanchester and Huntingdon - -	52	52	1	–	4	1	3	43	64,250	224,418	1,235	4,315
Leicestershire - - - -	98	103	1	–	6	3	13	80	169,350	510,204	1,644	4,953
Leicester - - - -	75	77	–	1	–	2	14	60	68,168	3,000	885	- -
Lincolnshire - - - -	268	268	1	–	19	4	35	209	343,140	1,742,329	1,304	6,500
Boston - - - -	15	15	–	1	–	–	3	11	15,038	4,820	1,002	- -
Grantham - - - -	5	5	–	1	–	–	1	3	4,954	314	991	- -
Great Grimsby - - -	10	10	–	1	–	–	2	7	11,032	1,518	1,067	- -
Lincoln (City) - - -	21	21	–	1	–	1	5	14	20,995	5,000	999	- -
Louth - - - -	6	6	–	1	–	–	1	4	10,468	2,560	1,744	- -
Stamford - - - -	10	10	–	1	–	–	3	6	8,044	1,711	804	- -
Norfolk, with Thetford - -	222	222	1	–	14	9	8	190	317,295	1,333,440	1,429	6,006
Great Yarmouth - - -	34	34	–	1	–	1	6	26	34,573	4,135	1,016	- -
King's Lynn - - -	19	18	–	1	–	–	4	13	15,981	2,620	887	- -
Norwich (City) - - -	88	91	–	1	1	5	13	71	74,414	6,638	817	- -
Northamptonshire - - -	104	110	1	–	5	10	11	83	167,854	575,763	1,525	5,234
Daventry - - - -	2	2	–	1	–	–	–	1	4,124	1,713	2,062	- -
Northampton - -	39	39	–	1	–	2	4	32	32,813	1,520	841	- -
Peterborough (Liberty) - -	18	18	‡1	–	1	1	2	13	22,655	51,695	1,258	2,871
Nottinghamshire, with East Retford - - - - -	138	138	1	–	7	6	16	108	207,691	521,110	1,505	3,776
Newark - - - -	11	11	–	1	–	–	2	8	11,562	2,080	1,051	- -
Nottingham - - - -	99	100	–	1	1	6	10	82	74,531	2,600	745	- -
Oxfordshire - - - -	95	95	1	–	7	4	10	73	140,730	469,935	1,481	4,946
Banbury - - - -	5	5	–	1	–	–	1	3	4,055	105	811	- -
Oxford (City) - - -	12	m 12	–	1	–	–	2	9	28,261	- -	2,355	- -
Rutlandshire - - - -	8	8	1	–	–	1	1	5	21,867	104,568	2,733	13,071

APPENDIX.

– – – – Counties and Boroughs—Rates of Pay.

RATES OF ANNUAL PAY.								RATES OF WEEKLY PAY.						Allowances to Chief Constables.	REMARKS.
Chief Constables of Counties.	Head Constables of Boroughs.	Superintendents.			Inspectors.			Serjeants.		Constables.					
		1st Class.	2d Class.	3d Class.	1st Class.	2d Class.	3d Class.	1st Class.	2d Class.	1st Class.	2d Class.	3d Class.	4th Class.		
13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	
£.	£.	£.	£.	£.	£.	£.	£.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	£.	
350	–	a 162 120	115	100	–	–	–	25 –	23 –	21 –	20 –	19 –	16 –	50	a Deputy Chief Constable. Superintendents allowed 50 l. to provide and keep horse.
–	142	–	–	–	–	–	–	24 –	–	22 –	21 –	20 –	19 –	–	
600	–	b 130 120	115	85	85	75	–	23 –	–	21 –	20 –	19 –	17 6	150	b Deputy Chief Constable.
–	45	–	–	–	–	–	–	–	–	*18 –	–	–	–	–	* Not including two supernumeraries, at 5 l. per annum.
–	90	–	–	–	–	–	–	–	–	18 –	–	–	–	–	
270	–	c 140	105	95	70	65	–	23 –	–	21 –	19 –	17 –	–	80	c Deputy Chief Constable.
–	159	–	–	–	75	–	–	24 –	23 –	21 –	20 –	19 –	17 –	–	
250	–	100	90	–	70	–	–	23 –	–	21 –	20 –	19 –	17 –	50	
–	100	–	–	–	–	–	–	22 –	21 –	20 –	18 –	–	–	–	
500	–	150	130 120	110 100 80 d 90	65	–	–	23 –	22 –	21 –	20 –	18 –	–	100	d Detective.
–	100	–	–	–	60	–	–	22 –	–	21 –	18 –	–	–	–	
–	175	–	–	–	e 91	70	–	e 24 –	23 – 22 –	21 –	20 –	19 –	18 –	–	e Detective.
450	–	130	115	100	85	75	65	23 –	–	21 –	19 –	17 –	–	160	The Deputy Chief Constable receives 50 l. extra.
–	104	–	–	–	–	–	–	23 –	–	20 –	18 6	17 –	–	–	
–	65	–	–	–	–	–	–	–	–	20 –	–	–	–	–	
f 500	–	95	–	–	75	–	–	–	–	21 –	19 –	17 –	–	–	f Including travelling expenses.
–	100	–	–	–	–	–	–	23 –	–	20 –	18 –	–	–	–	
–	72	–	–	–	–	–	–	25 –	–	22 –	20 –	19 –	–	–	
180	–	130	105	95	70	–	–	23 –	–	21 –	19 –	17 –	–	70	
450	–	130	120	100	75	–	–	23 –	22 –	21 –	19 –	17 –	–	95	Superintendents allowed 45 l. to provide and keep horse.
–	200	–	–	–	120	112	–	26 –	25 – 23 –	21 6	20 6	19 6	18 6	–	
500	–	120 110	95	85	70	–	–	25 –	24 –	21 –	19 6	18 –	–	200	Superintendents in Kesteven and Holland allowed 50 l. to provide and keep horse.
–	120	–	–	–	–	–	–	25 8	23 8 22 8	21 6	18 6	17 6	–	–	
–	70	–	–	–	–	–	–	23 –	–	19 –	–	–	–	–	
–	100	–	–	–	–	–	–	25 6	24 –	20 –	19 –	–	–	–	
–	120	–	–	–	78	–	–	g 26 –	24 6	21 6	19 6	–	–	–	g Detective.
–	123	–	–	–	–	–	–	23 –	–	20 –	19 –	–	–	–	
–	100	–	–	–	–	–	–	25 –	22 –	21 –	20 –	18 –	–	–	
400	–	170	120	115 100	71	–	–	23 6	–	21 –	19 –	17 –	–	175	
–	162	–	–	–	72	–	–	25 –	21 –	20 –	18 6	17 6	–	–	
–	100	–	–	–	–	–	–	23 –	21 –	20 –	18 –	–	–	–	
–	250	h 104	–	–	78	–	–	25 –	24 – 23 –	21 –	20 –	19 –	18 –	–	h Detective.
300	–	110	105	100 95	85	75	–	23 –	–	21 –	20 –	19 –	17 –	110	Superintendents allowed 50 l. per annum to provide and keep horse.
–	60	–	–	–	–	–	–	–	–	20 –	–	–	–	–	
–	200	–	–	–	89	–	–	26 –	24 –	21 –	19 –	18 –	–	–	
i 105	–	100	–	–	80	–	–	23 4	–	20 –	19 –	17 –	–	k	i The same chief constable as the county. k Actual expenses paid.
500	–	120 115	105 110	90 95	70	–	–	24 –	–	21 –	19 –	17 –	–	150	Superintendents allowed 50 l. per annum to provide and keep horse.
–	130	–	–	–	–	–	–	24 –	–	20 –	19 –	–	–	–	
–	325	155	–	–	80	l 67	–	24 –	–	21 –	20 6	20 –	19 – 18 –	–	l Detective.
375	–	110	105	100 80	75	70	–	23 –	–	21 –	20 –	19 –	17 –	125	
–	70	–	–	–	–	–	–	21 –	–	18 –	–	–	–	–	
–	m	–	–	–	–	–	–	22 –	–	18 –	15 –	–	–	–	m An incomplete return, made by one of the serjeants of this force.
250	–	–	–	–	65	–	–	23 –	–	21 –	19 –	–	–	–	

No. 1 District.—Established Police Force, - - - - - - -

COUNTIES and BOROUGHS.	Establishment.		DETAILS OF RANKS, 1865.						Population (Census 1861). 9.	Area in Acres. 10.	PROPORTIONS.	
	1864. 1.	1865. 2.	Chief Constables of Counties. 3.	Head Constables of Boroughs. 4.	Superintendents. 5.	Inspectors. 6.	Serjeants. 7.	Constables. 8.			Population to each Constable. 11.	Acres to each Constable. 12.
England—*continued.*												
Shropshire, with Oswestry and Wenlock - - - -	109	116	1	–	6	–	16	93	217,379	842,928	1,873	7,266
Bridgnorth - - - -	2	2	–	1	–	–	–	1	6,087	2,987	3,043	- -
Ludlow - - - -	5	5	–	1	–	–	1	3	5,178	280	1,035	- -
Shrewsbury - - - -	23	23	–	1	–	–	3	19	23,000	5,600	1,000	- -
Staffordshire, with Stafford and Tamworth - - - -	421	421	1	–	13	11	53	343	630,829	706,463	1,498	1,678
Lichfield (City) - - -	6	6	–	1	–	–	1	4	6,893	3,231	1,149	- -
Newcastle-under-Lyme - -	8	8	–	1	–	–	1	6	12,638	640	1,579	- -
Walsall - - - -	30	30	–	1	–	–	5	24	37,762	8,000	1,258	- -
Wolverhampton - - -	68	68	–	1	–	6	8	53	60,858	3,440	895	- -
Suffolk (East), with Beccles, Eye, and Orford - - - -	114	114	1	–	6	9	6	92	179,213	589,212	1,572	5,168
Ipswich - - - -	37	37	–	1	–	–	5	31	37,719	8,450	1,019	- -
Southwold - - - -	- -	No Return.		–	–	–	–	–	2,032	600	- -	- -
Suffolk (West), with Bury St. Edmunds - - - -	88	89	1	–	5	10	3	70	113,418	353,213	1,274	3,968
Sudbury - - - -	6	6	–	1	–	–	1	4	6,879	1,968	1,146	- -
Warwickshire - - - -	171	171	1	–	5	11	15	139	193,123	546,665	1,129	3,196
Birmingham - - -	377	377	–	1	6	15	48	307	295,955	8,420	785	- -
Coventry (City) - - -	36	37	–	1	–	3	4	29	40,937	1,660	1,106	- -
Leamington - - - -	21	21	–	1	–	2	2	16	17,452	1,571	831	- -
Stratford-on-Avon - -	4	4	–	1	–	–	1	2	3,672	108	918	- -
Warwick - - - -	11	11	–	1	–	–	2	8	10,589	24,808	962	- -
Worcestershire, with Evesham -	168	176	1	–	11	–	19	145	249,154	431,553	1,415	2,452
Bewdley - - - -	2	2	–	1	–	–	–	1	3,071	2,730	1,535	- -
Droitwich - - - -	2	2	–	1	–	–	–	1	3,123	1,562	1,561	- -
Kidderminster - - -	16	16	–	1	–	–	2	13	15,399	994	962	- -
Worcester (City) - - -	31	33	–	1	–	–	5	27	32,000	965	969	- -
NORTH WALES:												
Anglesea, with Beaumaris - -	23	23	1	–	–	2	5	15	54,609	193,453	2,374	8,411
Carnarvonshire, with Bangor and Carnarvon - - - -	48	55	1	–	3	2	9	40	92,776	367,995	1,686	6,690
Pwllheli - - - -	1	- A Return was made, but it was blank as to " Force."							2,795	1,000	—	—
Denbighshire, with Denbigh - -	57	57	1	–	2	4	6	44	104,316	374,303	2,371	6,566
Flintshire, with Flint - - -	37	37	1	–	3	1	3	29	69,849	185,264	1,887	5,007
Merionethshire - - - -	23	24	1	–	–	1	4	18	38,888	383,581	1,620	15,982
Montgomeryshire, with Montgomery and Welshpool - - -	29	31	1	–	1	1	2	26	66,919	483,323	2,158	15,591
TOTALS - - -	–	4,468	28	45	176	189	495	3,535				

TOTAL STRENGTH of FORCE in DISTRICT No. 1 - - - -
Ditto - - ditto - - ditto - - - - - -
Ditto - - ditto - - ditto - - - - - -
Ditto - - ditto - - ditto - - - - - -
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Ditto - - ditto - - ditto - - - - - -
Ditto - - ditto - - ditto - - - - - -

- - - - - - Counties and Boroughs, and Rates of Pay—*continued.*

RATES OF ANNUAL PAY.								RATES OF WEEKLY PAY.						Allowances to Chief Constables.	REMARKS.
		Superintendents.			Inspectors.			Serjeants.		Constables.					
Chief Constables of Counties.	Head Constables of Boroughs.	1st Class.	2d Class.	3d Class.	1st Class.	2d Class.	3d Class.	1st Class.	2d Class.	1st Class.	2d Class.	3d Class.	4th Class.		
13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	
£.	£.	£.	£.	£.	£.	£.	£.	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	£.	
300	–	120	100	90	70	–	–	23 –	22 –	21 –	19 –	–	–	100	Superintendents allowed 39 *l.* per annum to provide and keep horse.
–	65	–	–	–	–	–	–	–	–	20 –	–	–	–	–	
–	70	–	–	–	–	–	–	20 –	–	18 –	–	–	–	–	
–	106	–	–	–	–	–	–	24 –	–	21 –	20 –	18 –	–	–	
500	–	145	109	99	80	70	–	25 –	24 –	21 –	20 –	19 –	17 –	150	Superintendents allowed 50 *l.* per annum to provide and keep horse.
–	62	–	–	–	–	–	–	21 –	–	18 –	–	–	–	–	
–	90	–	–	–	–	–	–	21 –	–	20 –	19 –	16 –	–	–	
–	185	–	–	–	–	–	–	*a* 26 6	24 –	*a* 23 6	21 –	20 – 19 –	18 – 17 –	–	*a* Detective.
–	350	–	–	–	*b* 93	*c* 83	72	24 –	23 –	22 –	21 –	20 –	19 – 18 – 17 –	–	*b* Detective. *c* Clerk.
300	–	110	100	–	70	65	–	23 –	–	21 –	20 –	19 – 17 –	16 –	70	Superintendents allowed 50 *l.* per annum, to provide and keep horse.
–	130	–	–	–	–	–	–	24 –	–	21 –	19 –	17 –	–	–	
–	–	–	No Return.		–	–	–	–	–	–	–	–	–	–	
470	–	115	–	–	85	70	–	23 –	–	21 –	20 –	19 –	17 –	50	Superintendents allowed 46 *l.* per annum to provide and keep horse.
–	88	–	–	–	–	–	–	23 –	–	21 –	17 –	–	–	–	
350	–	110	100	95 90	80	75	–	23 –	–	20 –	21 –	19 –	17 –	150	Superintendents allowed 45 *l.* per annum to provide and keep horse.
–	450	140	130	–	125	109	104 80	25 –	24 –	22 –	20 –	19 –	18 – 17 – 14 –	–	
–	149	–	–	–	65	–	–	23 –	–	21 –	20 –	19 –	17 –	–	
–	250	–	–	–	95	80	–	25 –	–	22 6	21 –	20 –	18 6	–	
–	65	–	–	–	–	–	–	21 –	–	19 –	–	–	–	–	
–	70	–	–	–	–	–	–	23 –	–	21 –	20 –	18 –	–	–	
300	–	*d* 150 120	110 100	90 80	–	–	–	23 –	–	21 –	20 –	19 –	17 –	150	*d* Deputy chief constable. 40 *l.* per annum allowed for forage.
–	52	–	–	–	–	–	–	–	–	6 –	–	–	–	–	
–	62	–	–	–	–	–	–	–	–	20 –	–	–	–	–	
–	100	–	–	–	–	–	–	22 –	–	19 –	18 –	17 –	–	–	
–	180	–	–	–	–	–	–	24 –	–	21 –	19 6	18 –	16 –	–	
250	–	–	–	–	80	75	–	24 –	22 – 21 –	20 –	19 6	19 –	18 6 18 – 17 –	60	Inspector allowed 40 *l.* per annum to provide horse and cart.
250	–	90	80	–	73	–	–	24 6	–	21 –	20 –	19 –	18 – 17 4	80	Superintendents allowed 44 *l.* per annum to provide and keep horse.
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
300	–	100	–	–	100	75	–	25 –	–	23 –	21 –	20 –	18 –	50	Superintendents allowed 50 *l.* per annum to provide and keep horse.
250	–	105	75	–	65	–	–	23 –	21 –	20 –	18 –	16 –	–	50	Superintendents allowed 50 *l.* per annum to provide and keep horse.
250	–	–	–	–	70	–	–	23 –	–	18 –	–	–	–	50	Inspector allowed 45 *l.* per annum to provide and keep horse.
250	–	95	–	–	84	–	–	23 –	–	20 –	18 –	16 –	–	30	Inspector allowed 36 *l.* per annum to provide and keep horse.

- - - - on 1st October 1856 - - - 2,728
- - - - ditto 1857 - - - 3,985
- - - - ditto 1858 - - - 4,124
- - - - ditto 1859 - - - 4,154
- - - - ditto 1860 - - - 4,179
- - - - ditto 1861 - - - 4,204
- - - - ditto 1862 - - - 4,261
- - - - ditto 1863 - - - 4,354
- - - - ditto 1864 - - - 4,408
- - - - ditto 1865 - - - 4,468

William Cartwright, Lieutenant General,
H. M. Inspector of Constabulary for No. 1 District.

No. 2.
Northern District.

No. 2.—NORTHERN DISTRICT.

NINTH ANNUAL REPORT of Lieut.-Colonel *John Woodford*, Inspector of CONSTABULARY and POLICE FORCES in the Northern District, for the Year ended 29th September 1865.

To the Right Honourable Sir *George Grey*, Bart., G. C. B., &c. &c. &c., Her Majesty's Principal Secretary of State for the Home Department.

Sir, The Cliff, Preston, 29 November 1865.

HAVING completed my ninth annual inspection of the constabulary and police forces in the several counties and boroughs in the northern district, I have now the honour to lay before you my reports on the state of efficiency in which they appeared to me to have been maintained in the year ended on the 29th of September last.

In the course of my inspection I noticed that the difficulty of procuring properly-qualified men for service in the police, a difficulty which had already manifested itself previous to my last report, had in the interim become so greatly aggravated by the high rates of wages now paid for labour, and the strong inducements held out in other avocations for employment, in which men in the position of well-trained and intelligent police constables of good character are deemed to be peculiarly well adapted, that there seemed to be much danger of the service becoming seriously impaired.

Acting as it would seem upon this conviction, the justices, in some of the counties, and the watch committees in several of the boroughs, having taken the subject into consideration, determined upon meeting the difficulty, by revising and increasing, by regular progression, the rates of pay, in some instances, of the several ranks and classes, while in others the advance of pay was restricted to the lower ranks only, viz., serjeants and constables, with a view, no doubt, of inducing men of character and intelligence not merely to enter the service, but moreover to continue in it, by holding out the further inducement of such additional pecuniary advantages following upon length of service, as might reasonably be expected to have the desired effect.

For three years past it has been my duty to represent to you that the police force of the borough of Sheffield has not, in my opinion, been maintained in a state of general efficiency in point of number; I have now, however, the satisfaction to report, that by an augmentation ordered by the town council some time in January last, and since carried into effect, the numerical strength of that force is now again sufficient for the ordinary requirements of the borough.

I have further to acquaint you that, since my last report, the police forces of the boroughs of Doncaster and Warrington have also been augmented, and that I am of opinion that the authorised strength of each of those establishments is now sufficient for all the ordinary purposes of police within those boroughs.

Congleton, Macclesfield, Stockport, Kendal, Ashton-under-Lyne, Blackburn, Bolton, Oldham, Berwick, Richmond, Scarborough, Dewsbury, Ripon.

There still remain in this district 13 boroughs, named in the margin, in which the number of men maintained as constables is, in my opinion, so inadequate in proportion to the population as entirely to disentitle them to any participation in the annual grant from the Treasury. I have, however, the gratification to add, that in a large majority of those boroughs the officers and constables seemed, in the main, to have been selected with much judgment, and by their demeanour and air of individual efficiency appeared to be men well adapted for an intelligent discharge of their several duties.

It was my duty to represent to you, in my last report, that my attention having been directed to the practice of employing constables as collectors of money, under the denomination of market tolls, &c. &c., I had thereupon felt it incumbent upon me not only to prosecute inquiries upon the subject, but to point

No. 2
Northern District.

point out the propriety of discontinuing the practice in those boroughs where I found it to exist, as such employment of the men could not be looked upon as a part of their duty as police constables.

In regard to this matter, the only demur I have yet encountered was at South Shields, where the superintendent of the police force of that borough is still persistently employed as "collector of the market tolls."

I have, &c.
(signed) *J. Woodford*, Lieut.-Colonel,
Inspector of Constabulary.

COUNTY of CHESTER.

County of Chester

Population in 1861 - - - - - - -	329,227
Area in acres - - - - - - -	692,979
Number of constables - - - - - -	235
Population to one constable - - - -	1,400

The township of Claughton, comprising 436 acres, and containing, at the census of 1861, a population of 1,584 persons, having been absorbed by the borough of Birkenhead, the charge thereof has necessarily been relinquished by the chief constable of the county constabulary.

This force, which seems to be composed of an intelligent and very effective body of men, well clothed and well appointed, having had an augmentation of four men, consisted in the whole, when inspected between the 18th and 24th of April, of 235 officers and constables, of whom eight constables are retained at head quarters as a reserve, and seven have been appointed under the provisions of the Act 3 & 4 Vict. c. 88, s. 19.

The books in the several divisions appeared to have been well and properly kept, and such of the station-houses, offices, and cells for prisoners as fell under inspection were very clean and in good order.

The Inspector has pleasure in reporting that, in his opinion, the constabulary force of this county has been maintained in a highly satisfactory state of discipline and efficiency.

BOROUGH of BIRKENHEAD.

Borough of Birkenhead.

Population in 1861 - - - - - - -	37,532
Area in acres - - - - - - -	1,577
Number of constables - - - - - -	95
Population to one constable - - - - -	395

The boundary of this borough has been extended, and the number of the population slightly increased, by the annexation of the township of Claughton, which covers an area of 436 acres, and at the census taken in 1861 contained a population of 1,584 persons.

This police force is composed of a remarkably fine body of men, and when inspected on the 21st April was found to have had, since the last report, an augmentation of 10 men, making a total strength of 95 officers and constables; but of this number one inspector and 22 constables continue to be maintained at the expense of the Mersey Docks and Harbour Company.

The clothing and accoutrements of this force were of good quality and in good serviceable condition; the offices and charge-room, which are sufficiently commodious, and the cells for prisoners, were clean and in good order, and the books appeared to have been well and properly kept.

Shortly after the inspection an addition of 50 *l.* per annum was made to the pay of the head constable.

The Inspector has, in conclusion, to report that, in his opinion, this force has been maintained in a highly satisfactory state of discipline and general efficiency.

BOROUGH of CHESTER.

Borough of Chester.

Population in 1861 - - - - -	31,101
Area in acres - - - - - -	3,518
Number of constables - - - - -	36
Population to one constable - - - -	864

There has not been any alteration in the strength of the police force of this city since the last report, though a considerable number of changes have taken place among the men, by resignation or dismissal, to the extent of nearly two-fifths of the whole establishment.

When inspected, on the 22d April, the force was complete, and presented the appearance of a fine and very effective body of men; the clothing, however, seemed to be somewhat deficient in quality, or, at any rate, much inferior to that which had been provided in some other boroughs at no greater expense.

The books appeared to have been well kept. The office, charge-room, and cells for prisoners being of a temporary character, pending the rebuilding of the town-hall, do not call for any observations beyond the fact that they were clean and in good order.

The Inspector is of opinion that the number of this force is, on the whole, sufficient for the ordinary duties of the city, and that there are good grounds for believing that it will be maintained in a satisfactory state of efficiency.

BOROUGH of CONGLETON.

Borough of Congleton.

Population in 1861 - - - - - -	12,338
Area in acres - - - - - - -	2,564
Number of constables - - - - -	6
Population to one constable - - - -	2,056

Ostensibly there has been an addition to this force of one constable, but as he is maintained at the expense of a body styled the "Silk Association," the number supported by the Town Council remains the same as before.

As, in other respects, there has been no alteration whatever, there is nothing left to the Inspector but once more to report that, in his opinion, the number of this establishment is not sufficient.

When inspected, on the 18th of April, it appeared that the books, though few, had not been very carefully kept; and that a considerable degree of dampness had begun to exhibit itself in some of the cells for prisoners, which seemed to have arisen from faulty construction or a defective site.

BOROUGH of MACCLESFIELD.

Borough of Macclesfield.

Population in 1861 - - - - - -	36,095
Area in acres - - - - - - -	2,410
Number of constables - - - - -	17
Population to one constable - - - -	2,123

No alteration has been made in the number of this police force since the last report, but when inspected, on the 19th of April, it was stated that steps had been taken to supply the men with an additional pair of trowsers.

This establishment, though few in number, appeared to consist of a respectable and healthy body of men; their clothing and accoutrements were in good serviceable condition; the books seemed to have been well and systematically kept, and the cells for prisoners, though for reasons already stated liable to some objections, were very clean and in good order.

No superannuation fund has been established in this borough.

In the opinion of the Inspector this police force is not sufficient in number.

BOROUGH of STALEYBRIDGE.

Borough of Staleybridge.

Population in 1861 - - - - - -	24,806
Area in acres - - - - - - -	883
Number of constables - - - - -	25
Population to one constable - - - -	992

No change has taken place in the strength of this police force since the last report. When inspected, on the 20th April, there was one man required to complete the establishment.

The force seemed to consist of a healthy and effective body of men, and presented a very creditable appearance; their clothing was of good quality, well fitted, and, together with their accoutrements, in good serviceable condition. A helmet similar to that worn by the Metropolitan police has been taken into wear in this borough.

The books appeared to have been well kept; the office is very commodious, and the cells for prisoners were clean and in good order.

The Inspector is of opinion that this police force has been maintained in a satisfactory state of efficiency.

BOROUGH of STOCKPORT.

Borough of Stockport.

Population in 1861 - - - - - -	54,681
Area in acres - - - - - - -	3,167
Number of constables - - - - - -	15
Population to one constable - - - -	3,617

The permanent police force of this borough consists of one chief superintendent, one inspector, two serjeants, twelve constables, and one man employed as clerk, at a salary of 17 *s.* 6 *d.* a week; besides these there is a small body of nine men commonly employed as scavengers, who are occasionally called upon to assist the police, at which times they appear in uniform, which is supplied to them in every alternate year.

This force, with the exception of boots, of which only one pair is issued annually, is well supplied with clothing of an unusally superior quality.

The books appeared to have been properly kept, and the office, charge-room, and cells for prisoners were clean and in good order.

The number of this establishment, in the opinion of the Inspector, is not sufficient for the ordinary duties of this large and populous borough.

COUNTIES of CUMBERLAND and WESTMORLAND.

Counties of Cumberland and Westmorland.

Population in 1861 - - - - - -	224,638
Area in acres - - - - - - -	1,482,863
Number of constables - - - - -	141
Population to one constable - - - -	1,593

Although these two counties are to some extent united for police purposes, it has always been considered expedient, and acted upon accordingly, that the justices of each county should from time to time declare the rank and number of the constables to be appointed for their respective counties.

Thus of the total number given above, of whom nine constables have been appointed under the provisions of the 19th section, and one under the 20th of the 3d & 4th Vict. c 88, 113 men, exclusive of the chief constable, have been appointed for Cumberland, being in the proportion of one constable to 1,556 of the population. The number appointed for Westmorland, also exclusive of the chief constable, is 27, the proportion in this case being one constable to 1,806 of the population; there appear, however, to be very sufficient reasons in the different circumstances of the population in particular places for this variation in number and proportion.

No. 2. Northern District.

In the whole there has been, since the last report, an addition of 21 men to this combined establishment, 15 to the permanent strength of the Cumberland force, four to that of Westmoreland, and two "additional constables" under the provisions of the Act 3 & 4 Vict. c. 88, s. 19.

The inspection of this force, which is composed of a healthy and effective body of men, was begun on the 12th and completed on the 22d of June.

The clothing and accoutrements were in good condition, the books seemed to have been well and properly kept, and the station-houses, charge-rooms, and cells for prisoners were clean and in good order.

The Inspector has the gratification to add that, in his opinion, the constabulary force of these united counties has been maintained in a satisfactory state of general efficiency.

BOROUGH of CARLISLE.

Borough of Carlisle.

Population in 1861 - - - - - -	29,436
Area in acres - - - - - - -	3,842
Number of constables - - - - -	31
Population to one constable - - - -	950

The police force of this city is of the same permanent strength as last year, but the changes which have taken place among the ordinary constables since the last report have been numerous in a very remarkable degree, brought about by the death of one, the resignation of eight, and the dismissal of 20 men. It is to be apprehended that this state of things can only arise from one of two causes, either there may be some want of care in the selection of the men, or which is perhaps more probable, the rates of pay granted to the lower ranks, though formerly considered ample, are not now sufficient to induce suitable men to enter and remain in the service.

The establishment was complete when inspected on the 12th of June, but two constables were laid up with the small-pox. The clothing, which had recently been issued to the men, was unusually coarse in texture, and did not seem to be of durable material. The books appeared to have been well and properly kept, and the office, charge-room, and cells for prisoners were very clean and in good order.

The Inspector is of opinion that the authorized strength of this force is sufficient for the ordinary duties of the city.

BOROUGH of KENDAL.

Borough of Kendal.

Population in 1861 - - - - - -	12,028
Area in acres - - - - - - -	2,720
Number of constables - - - - -	5
Population to one constable - - - -	2,405

There has not been any change made in the police force of this borough since the last report. It consists now, as before, of one serjeant and four constables only.

This small force, though not consolidated with the county, is, together with the police books and the cells for prisoners, placed under the charge of one of the superintendents of the county.

The men are well supplied with clothing and the usual accoutrements, which, when inspected on the 20th June, were found in good serviceable condition.

The books seemed to have been well kept, and the charge-room and cells were clean and in good order.

The Inspector has again to report that, in his opinion, this police force is not sufficient in number for the ordinary duties of the borough.

County of Durham.

County of Durham.

Population in 1861 - - - - - -	333,934
Area in acres - - - - - -	608,902
Number of constables - - - - -	276
Population to one constable - - - -	1,210

The inspection of the constabulary force of this county, which since the last report has had an augmentation of 10 men, commenced on the 23rd and terminated on the 31st of May, at which time the establishment was complete, and consisted in the whole of 276 officers and constables, of whom, however, 48 (a number which includes the whole of the recent addition to the force) have been appointed under the provisions of the Act 3 & 4 Vict. c. 88, s. 19.

The force consists of a remarkably fine and very effective body of men, well clothed and well supplied with the requisite accoutrements, all of which were in good condition.

The books, both at head quarters and in the several divisions, seemed to have been well and uniformly kept, and the station-houses (with the exception of two in which there were indications of dampness, arising apparently from defective drainage, and of one where more extended accommodation seemed to be requisite), the charge-rooms, quarters for the men, and cells for prisoners were sufficiently commodious, very clean, and in good order.

In the opinion of the Inspector this force has been maintained in a very satisfactory state of discipline and efficiency.

Borough of Durham.

Borough of Durham.

Population in 1861 - - - - - -	13,743
Area in acres - - - - - - -	8,599
Number of constables - - - - -	13
Population to one constable - - - -	1,057

There has been no change in the number of this police force since the last report. The establishment, when inspected on the 26th of May, was complete and consisted of a smart-looking and, to all appearance, a very effective body of men who are well supplied with clothing and the usual accoutrements, all of which were in excellent condition. The charge-room seems to be inconveniently small, and the cells for prisoners, from their position and construction, requiring that in the main they should be lighted by gas, and subject at times to considerable dampness (though as clean as, under the circumstances, could reasonably be expected) are certainly such as seem to require a little more consideration at the hands of the Watch Committee.

The Inspector is of opinion that this force is sufficient in number for the ordinary duties of the city, and that it has been maintained in a satisfactory state of efficiency.

Borough of Gateshead.

Borough of Gateshead.

Population in 1861 - - - - - -	33,589
Area in acres - - - - - - -	3,255
Number of constables - - - - -	33
Population to one constable - - - -	1,017

The inspection of the police force of this borough was made on the 1st of June, when it was found complete in number and of the same strength as in the previous year.

This force bore the appearance of a respectable and effective body of men, possessed of a good and abundant supply of clothing and the usual accoutrements, all of which were in good serviceable condition.

The office, charge-room, and cells for prisoners, were very clean and in good order, and the books appeared to have been well kept.

In the opinion of the Inspector this police force has been maintained in a satisfactory state of efficiency.

Borough of Hartlepool.

Borough of Hartlepool.

Population in 1861 - - - - - - -	12,205
Area in acres - - - - - - - -	990
Number of constables - - - - - -	12
Population to one constable - - - - -	1,017

There has been no change in the strength of the police force of this borough since the last report.

When inspected, on the 25th of May, the establishment was complete, and, though few in number, carried the appearance of a very effective body of men.

The clothing and accoutrements, with which the men are well supplied, were in good serviceable condition; and the books seemed to have been pretty well kept.

As measures have been taken by the Town Council for the provision of suitable premises for police purposes, those hitherto in use do not seem to call for any further observations than those made in previous reports.

The number of this force is sufficient for the ordinary duties of the borough; and, in the opinion of the Inspector, the establishment has been maintained in a satisfactory state of efficiency.

Borough of South Shields.

Borough of South Shields.

Population in 1861 - - - - - - -	35,223
Area in acres - - - - - - - -	2,566
Number of constables - - - - - -	35
Population to one constable - - - - -	1,006

This police force, which consists of a fine and effective body of men, was inspected on the 31st of May, when it was complete, and was found unchanged in point of number since the last report.

The clothing and accoutrements in the possession of the men were in good condition. The accommodation provided for police purposes had been enlarged and greatly improved; the books appeared to have been well kept, and the cells for prisoners were very clean and in good order.

With reference to his last report, and to other representations made by him upon the subject, the Inspector has again to report that the superintendent of this borough is still required to collect the "market tolls."

Subject to this drawback, if indeed it should be so considered, the Inspector is of opinion that this police force has been maintained in a satisfactory state of efficiency.

Borough of Sunderland.

Borough of Sunderland.

Population in 1861 - - - - - - -	80,324
Area in acres - - - - - - - -	3,772
Number of constables - - - - - -	80
Population to one constable - - - - -	1,004

The police force of this borough, consisting of the same number of officers and constables as in the previous year, was inspected on the 1st of June, when the establishment was found complete, and composed of a fine, and, to all appearance, a highly effective body of men, remarkably well clothed, and well supplied with the usual accoutrements, all of which were in good serviceable condition.

The books appeared to have been well kept; and the men's quarters, the office, charge-room, and cells for prisoners, were sufficiently commodious, very clean, and in good order.

In addition to the force maintained by the Town Council, the head constable of this borough has at his disposal a small but very effective body of men, termed "The River Wear Police," consisting of one inspector, five serjeants, and 17 constables.

This force, in the opinion of the Inspector, has been maintained in a satisfactory state of discipline and efficiency.

County of Lancaster.

County of Lancaster.

Population in 1861 - - - - -	1,085,404
Area in acres - - - - - -	1,184,067
Number of constables - - - - -	779
Population to one constable - - - -	1,393

The inspection of the constabulary force of this county was begun on the 22d of June and completed on the 10th of July, at which time there were 15 men required to complete the establishment, which, having since the last report had an augmentation of 16 men, consisted then of one chief constable, one assistant chief constable, one chief clerk, one assistant clerk, 20 superintendents, 18 inspectors, 114 serjeants, and 623 constables, making a total of 779 officers and men, of whom one serjeant and 10 constables have been appointed under the provisions of the Act 3 & 4 Vict. c. 88, s. 19.

This force is composed of an effective and well-trained body of men, many among them possessing the further inestimable advantages of long experience and a thorough knowledge of their duties as constables. They are well supplied with clothing and the usual accoutrements, all of which appeared to be in good condition; the books seemed to have been well and systematically kept; and the offices, charge-rooms, and such of the station-houses as fell under inspection, were sufficiently commodious, very clean, and in good order.

Much difficulty having been experienced for a considerable length of time in procuring and retaining in the service such men as could be safely entrusted with the duties of a constable, the justices of the county determined upon meeting the difficulty, occasioned by the general advance of wages and the competition thereby created, by the adoption of the following revised scale of pay, which, having been sanctioned, came into operation on the 1st of July last.

Copy of Revised Scale of Pay.

RANKS.	On Appointment.			After Service of Three Years.			After Further Service of Four Years.		
	Weekly.			Weekly.			Weekly.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.
Serjeant - - - - -	1	5	8	1	6	10	1	8	–
Constable, 1st class - - -	1	2	2	1	2	9	1	3	4
Ditto - 2nd class - - -	1	1	0	—			—		
Ditto - 3rd class - - -	–	19	10	—			—		
Class of Merit - - - -	–	1	2	—			—		

This constabulary force, in the opinion of the Inspector, has been maintained in a very satisfactory state of general efficiency and discipline.

Borough of Ashton-under-Lyne.

Borough of Ashton-under-Lyne.

Population in 1861 - - - - - -	34,894
Area in acres - - - - - - -	1,737
Number of constables - - - - -	23
Population to one constable - - - -	1,517

There has been no change in the police force of this borough in point of number since the last report. The inspection of the force was made on the 26th of June, when the establishment was found complete, though one of the constables was under suspension for misconduct.

The men assembled for inspection presented a very creditable appearance; the clothing and accoutrements in their possession were in good serviceable condition;

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condition; the books seemed to have been well kept, and the office, charge-room, and cells for prisoners, all of which appeared to be sufficiently commodious were very clean and in good order.

The Inspector has to report that, in his opinion, the authorized strength of this force in not sufficient.

BOROUGH of BLACKBURN.

Borough of Blackburn.

Population in 1861 - - - - - -	63,125
Area in acres - - - - - - -	3,681
Number of constables - - - - -	38
Population to one constable - - - -	1,661

There has been no alteration of number in the police force of this borough since the last report. The establishment, when inspected on the 7th July, was complete, and presented the appearance of a well-chosen and respectable body of men; the clothing and accoutrements were in good condition; the books seemed to have been properly kept, and the office, though small and not very commodious, was, together with the cells for prisoners, clean and in good order.

The Inspector is of opinion that, in proportion to the extent and population of the borough, this force is not sufficient in number.

BOROUGH of BOLTON.

Borough of Bolton.

Population in 1861 - - - - - -	70,396
Area in acres - - - - - - -	820
Number of constables - - - - -	40
Population to one constable - - - -	1,760

The strength of this police, when inspected on the 28th June, was the same as in the previous year, but there was one man required to complete the establishment, and one man was reported sick. The head constable has since reported that an addition of two men was made on the 6th of September; the force now therefore consists in the whole of 40 men, all ranks inclusive. The men assembled for inspection presented a very creditable appearance; their clothing and accoutrements, with which they are well supplied, were in good condition; the books appeared to have been well kept, and the cells for prisoners (some of which are not so well ventilated as they might be, were they better constructed) seemed to be in the main sufficiently secure, and were as clean as could reasonably be expected. Since the last report the pay of this force has been increased—that of the head constable being now 180 *l.* a year; the pay of the inspector 95 *l* a year; the pay of the serjeants 29 *s.* 8 *d.* and 26 *s.* 6 *d.* a week; and the pay of the constables varying from 23 *s.* 3 *d.* to 22 *s.* 1 *d.*, and so on down to 18 *s.* 6 *d.* a week.

In the opinion of the Inspector this force is far from being of sufficient strength for the proper discharge of the ordinary duties of this very populous borough.

BOROUGH of BURNLEY.

Borough of Burnley.

This borough is consolidated with the county of Lancaster for police purposes.

BOROUGH of LANCASTER.

Borough of Lancaster.

Population in 1861 - - - - - -	13,521
Area in acres - - - - - - -	1,240
Number of constables - - - - -	13
Population to one constable - - - -	1,040

The police force of this borough was inspected on the 24th of June, when the establishment was complete, and consisted to all appearance, though but few in number, of a very respectable body of men; their clothing and accoutrements were in good serviceable condition; the books appeared to have been properly kept: and the cells for prisoners, though susceptible of improvement in respect of interior fittings, were very clean.

Since

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Since the last report, 20 *l.* a year has been added to the pay of the superintendent, and sixpence a week to that of the serjeants and constables.

The Inspector has further to report that, in his opinion, this force has been maintained in a satisfactory state of efficiency.

BOROUGH of LIVERPOOL.

Borough of Liverpool.

Population in 1861		443,874
Area in acres		5,300
Number of constables	Town, 717 Docks, 313 River, 22	1,052
Population to one constable		422

The inspection of the police force of this borough occupied two days, the 29th and 30th of June, at which time there were 29 men required to complete the establishment; 14 were reported sick from natural causes, 11 injured in the execution of their duty, one on leave of absence, and one employed on special duty.

Since the last report, a small body of men, consisting of one superintendent, three coxswains, and 18 constables, has been organized for service on the river; this is in addition to the constables employed at the expense of the borough and docks respectively, viz.—(as shown by the latest returns), 717 of the former and 313 of the latter. It will be seen that these numbers, in their proportions, are different to those given in the last report, when the number of men apportioned to the borough as the "Town Division" was 690, the number attached to the "Dock Division" having then appeared to be 340. With the augmentation above mentioned, the present authorised strength of the police force of the borough amounts in the whole to 1,052 officers and constables.

This force, when assembled for inspection on the 29th June, was put through a variety of military movements by Major Greig, the very able and zealous head constable of the borough, which were executed with remarkable steadiness and precision. The men looked well, and, to all appearance, thoroughly effective; the clothing and accoutrements were in excellent condition; the books appeared to have been well kept, and those cells for prisoners which fell under inspection on this occasion were very clean and in good order, with the exception of those in two of the smaller bridewells, which by reason of their position, being partly underground, are neither fit nor altogether safe of approach when drunken or unruly prisoners have to be dealt with.

The difficulty of obtaining duly qualified men for service in the police was adverted to in the last report on the state of the force in this borough. Finding that this difficulty was in no degree alleviated by time, the Watch Committee at length determined upon submitting the subject to a sub-committee for inquiry and consideration. On the 22nd of August last, the sub-committee presented a report recommending an increase of the pay of the several ranks and classes: that report, from which the following extracts and the revised scale of pay have been taken, having been approved of by the Watch Committee, was laid before the Town Council on the 6th of September, when it was finally adopted and confirmed:

> The sub-committee appointed to consider the pay and allowances of the police force of the borough, report as follows:—Your sub-committee having carefully inquired into the matters referred to them—having heard the statements of the head constable thereon, and having had before them full information as to police arrangements in other parts of the United Kingdom, find—
>
> 1. That it is difficult to obtain thoroughly competent and suitable men to join the force, owing to the superior pecuniary inducements held out to them in other avocations; and that, notwithstanding the daily increasing requirements as to the services of the police, the force has not for some time past had its full complement of men.
>
> 2. That it is also difficult, from the same cause, to retain men in the force when they have joined; and that it is most desirable, after a good officer has acquired a knowledge of police duty, that his services should be permanently secured. Upwards of 25 per cent. of the whole strength of the force leave in the course of 12 months, causing additional expense as to clothing, and, irrespective of the time consumed in instructing new men, impairing the general efficiency of the body.

3. That

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3. That the character and habits of a large portion of the population, and other peculiar circumstances connected with the town, render it of the highest importance that the Corporation should have for police officers not only men respectable in character but possessing considerable intelligence, and that the best means by which this object can be attained, and the difficulties above mentioned be overcome, are by increasing the rate of pay on admission into the force, and by making such re-arrangements of the staff and augmentation of wages as will induce men who have once entered the service to make it their occupation for life.

Your sub-committee have therefore prepared a statement of the alterations which, with due regard to sound economy, appear to them best calculated to accomplish those purposes, and they submit the same for the consideration of the Watch Committee.

(signed) *John Woodruff*, Chairman.

Town Hall, 21 August 1865.

Resolved—That the report be approved, and that it be recommended to the Council to have the proposed alterations carried into effect.

(Extracted from the proceedings.)
(signed) *Wm. Shuttleworth*, Town Clerk.

Revised Scale of Pay.

LIVERPOOL CONSTABULARY.

—	GRADES OR RANKS, WITH RATES OF PAY.	Deductions for Superannuation (17 & 18 Vict., 1854).
2	Divisional Superintendents 310 *l.* and 260 *l.* per annum -	
1	Superintendent of River Police 250 *l.* per annum - -	3½ per cent.
1	In-door Superintendent - 235 *l.* " - -	
1	Chief Clerk - - - 160 *l.* " - -	
1	Statistical Clerk - - - 180 *l.* " - -	
1	Superintendent of Fire Brigade 176 *l.* " - -	
1	Governor of Main Bridewell - 175 *l.* " - -	
6	Superintendents - 160 *l.* and 156 *l.* " - -	
1	Storekeeper - - - 110 *l.* " - -	
1	Beadle - - - - 110 *l.* " - -	
2	Detective Inspectors - - 125 *l.* " - -	
3	1st Class - ditto - - 105 *l.* " - -	
16	2d ditto - ditto - - 36 *s.* per week - -	
32	3d ditto - ditto - - 33 *s.* " - -	10 *d.* per week.
–	4th ditto - ditto - - 30 *s.* " - -	- ditto.
1	Inspector of Fire Brigade - 110 *l.* per annum - -	3½ per cent.
3	1st Class Clerks - - - 36 *s.* per week - -	- ditto.
5	2d ditto - ditto - - - 33 *s.* " - -	10 *d.* per week.
–	3d ditto - ditto - - - 30 *s.* " - -	- ditto.
32	Bridewell Keepers - 29 *s.* and 27 *s.* " - -	10 *d.* and 8 *d.* per week.
7	1st Class Detective Constables 30 *s.* " - -	10 *d.* per week.
7	2d ditto - ditto - ditto 28 *s.* " - -	- ditto.
5	Assistant Clerks - 27 *s.* and 24 *s.* " - -	8 *d.* and 7 *d.* per week.
30	1st Class Firemen - - - 26 *s.* " - -	8 *d.* per week.
40	2d ditto - ditto - - - 24 *s.* " - -	7 *d.* per week.
78	3d ditto - ditto - - - 22 *s.* " - -	- ditto.
100	1st Class Constables - - 24 *s.* " - -	- ditto.
300	2d ditto - ditto - - - 22 *s.* " - -	- ditto.
200	3d ditto - ditto - - - 21 *s.* " - -	6 *d.* per week.
152	4th ditto - ditto - - - 20 *s.* " - -	- ditto.
3	River Police, Coxswains - 25 *s.* " - -	8 *d.* per week.
18	Ditto - Constables - 22 *s.* " - -	7 *d.* per week.

Total Strength of the Force - - - - - - 1,052

Strength of Fire Brigade - - - -	Superintendent - - -	1
	Inspector - - - -	1
	Constables - - -	148
	TOTAL - - -	150

Deductions when Sick.—No deductions from salaried officers. The other officers and men, when sick, have their pay stopped, the annual amount being about 2,300 *l.*; they subscribe, on an average, 4 *d.* per week to a sick club, from which they draw 12 *s.* per week when ill, and in case of death 12 *l.* for funeral expenses.

Allowances.—The divisional superintendents, in-door superintendent, and two superintendents, superintendent and inspector of fire brigade, governor of Main Bridewell, and the resident bridewell keepers,

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keepers, have each a free residence in their respective divisions and at their stations. Uniform clothing is supplied; but when not worn by constables on special duty an allowance is given of 2 *s.* per week, and two pairs of boots annually. Inspectors and clerks, 1 *l.* 6 *s.* 8 *d.* annually for boots. Superintendents, 2 *l.* 2 *s.* annually for hats and boots. Chief clerk, statistical clerk, storekeeper, and detective inspectors, 13 *l.* per annum; and clerks 2 *s.* per week, in lieu of uniform clothing. Any officer or constable entitled to superannuation, and able and willing to continue in the service, shall, in addition to his full pay, be entitled to a yearly sum in proportion to his pay.

Retiring Allowances from Superannuation.—After 15 years' service, a sum not more than one-half nor less than three-eighths of average pay. After 20 years' service, a sum not more than two-thirds nor less than one-half of average pay, provided the age be not under 52 years if below the rank of superintendent, and 55 of or above that rank. After 10 years' service, a sum not exceeding three-eighths nor less than one-fourth, if worn out. After five years, a gratuity equal to 20 days' pay for every year's service. Men disabled by bodily injuries, received in the execution of their duty, may be allowed an annual sum not exceeding two-thirds.

Central Police Office, 8 September 1865. (signed) *J. J. Greig,*
Head Constable.

The Inspector, in conclusion, is much gratified in reporting that, notwithstanding the difficulty experienced in obtaining competent men to supply vacancies, this force has, in his opinion, been maintained in a highly satisfactory state of discipline and general efficiency.

BOROUGH of MANCHESTER.

Borough of
Manchester.

Population in 1861 - - - - - -	338,346
Area in acres - - - - - -	4,069
Number of constables - - - - -	670
Population to one constable - - - -	505

The inspection of the several station-houses, charge-rooms, cells for prisoners, and the books connected with the police force of this city, was made on the 11th, but owing to the interruption occasioned by the general election and other unavoidable causes, the men were not inspected till the 27th of July, at which time there were 36 men required to complete the establishment, consisting in the whole of 670 officers and constables, eight of whom, however, are not maintained at the expense of the borough. This force, when assembled for inspection, presented the appearance of a well-chosen effective body of men, and executed a variety of military movements with much steadiness and precision; their clothing and accoutrements were in good condition; the books both at the central station and in the offices of the several divisions appeared to have been properly kept; and the quarters for the men, charge rooms, and the generality of the cells for prisoners, were very clean and in good order.

The same difficulty of obtaining the services of men suitable for the police which had manifested itself in various other places having also been felt here, the Watch Committee referred the subject to the consideration of a sub-committee, from whose report, which was presented and adopted on the 3d of August, the following extracts have been taken, viz:—

Your sub-committee have considered the report of the chief constable on the difficulty he experiences in obtaining suitable men to serve in the police force, and in consequence of which the efficiency of the force is much impaired. It appears that this difficulty has existed for some time, but it has much increased within the past twelve months.

Your sub-committee are informed that the same difficulty in obtaining men exists in other police forces, and that in the constabulary of this county and the borough of Liverpool the subject has been under the consideration of the authorities, and that in the county it has been already decided to make a considerable advance in the pay and salaries of the different ranks.

It will be admitted that, to attract men possessed of the requisite qualifications for the important duties of a police constable, whose education and character must be superior to those of an ordinary labourer, some higher inducement must be offered than the wages which can be earned by unskilled workmen. Your sub-committee, after due inquiry, consider that the present wages of the city police are not sufficient to attract men of the proper stamp, and they find that many promising young constables are tempted to leave the force after a few months trial by the higher inducements which are elsewhere offered.

The attention of your sub-committee has been directed to the present pay of a constable, and to the restrictions with which it is surrounded, and more particularly to the fact that, however active and useful a constable may prove himself to be, he has no advance to look forward to excepting by promotion to a higher rank. The number of

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prizes in the way of promotion is comparatively small, as the proportion of officers to constables is about one to 6½, and vacancies are of such rare occurence that a constable may have to wait for years without having the opportunity of being advanced to a superior grade. It must also be remembered that a man may possess all the requisites for an excellent constable, and yet not be fit for the duties of an officer. With the view of providing a remedy, your sub-committee propose to modify the rules relating to the length of service required for advancement to the higher rates of pay, and also to introduce a system of rewarding those men who specially distinguish themselves by their activity and intelligence in the discharge of their duties.

The scale which your sub-committee recommends for adoption is as follows, viz.—

Probationary constables, on joining the force and until permanent appointment[*] - - - -	18 *s.* per week.
Third class constables, from permanent appointment until they have completed a service of one year and six months in the force - - - - -	19 *s.* ,,
Second class constables, after 18 months, if conduct has been unexceptionably good - - - -	20 *s.* ,,
First class constables, after further service of 18 months, or entire service of three years, on the same conditions as above - - - - -	21 *s.* ,,

Your sub-committee further suggest that there shall also be two merit classes, the number of men in each class being limited to 10 in each division; that the first merit class shall receive an additional weekly allowance of 2 *s.* 6 *d.*, and the second merit class an additional weekly allowance of 1 *s.*

That appointments to these classes shall be specially reserved for those constables who distinguish themselves by their general good conduct and marked activity and usefulness in the discharge of their duties. That selections for the merit distinction may be made from either the first, second, or third classes.

Second class serjeants, on promotion - - -	26 *s.* per week.
First class serjeants to be limited to one half the entire number of serjeants, and it being necessary that a second class serjeant to be eligible must have served three years, and have distinguished himself by activity and usefulness - - -	28 *s.* ,,
Second class inspectors, on promotion - - -	34 *s.* ,,
First class inspectors in five years - - -	38 *s.* ,,

That the superintendents shall, on appointment, receive 175 *l.* per annum, inclusive of 15 *l.* allowance for a house, and in two years, providing they continue to give satisfaction, 200 *l.* per annum. That those superintendents for whom house accommodation is provided at the police stations shall not receive the allowance of 15 *l.*

In conclusion, the Inspector has to report that he is convinced that no steps have been left untried in the endeavour to keep up this force to its full complement, and to maintain it in a complete state of efficiency.

BOROUGH of OLDHAM.

Borough of Oldham.

Population in 1861 - - - - - -	72,334
Area in acres - - - - - - -	4,617
Number of constables - - - - - -	54
Population to one constable - - - - -	1,339

The numerical strength of this police force has been increased by the addition of two men, and a change in its organisation has been effected by an increase of two inspectors and two serjeants; the force, as now constituted, consisted therefore, when inspected on the 15th of July, of one chief constable, five inspectors, eight serjeants, and 40 constables; there was, however, one man required to complete the establishment, which was composed of a smart and apparently a well selected body of men, well supplied with clothing and the usual accoutrements, which were in good condition. The books appeared to have been well kept; and the office and charge-rooms, which are sufficiently commodious, together with the cells for prisoners (some of which are not altogether free from objection on account of their position in the basement of the town hall), were clean and in good order.

Two

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[*] Constables have generally to serve about two months as probationers.

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Two newly built, exceedingly well arranged, and very judiciously placed, auxiliary police stations have recently been established in this borough, which will undoubtedly be found of much advantage to the service.

The Inspector, however, is constrained to add that, in his opinion, this force is not of sufficient strength for the proper discharge of the duties of this large and populous borough.

BOROUGH of PRESTON.

Borough of Preston.

Population in 1861 - - - - - -	81,077
Area in acres - - - - - - -	2,753
Number of constables - - - - - -	82
Population to one constable - - - - -	988

The police force of this borough, which consists of a fine and, to all appearance, a very effective body of men, was inspected on the 10th of June, when it was found to be of the same authorised strength as before; but there was one man required to complete the establishment.

The men are well supplied with clothing and the usual accoutrements, all of which appeared to be in very good condition.

The books seemed to have been properly kept; and the office, charge-room, and cells for prisoners were very clean and in good order.

In the opinion of the Inspector this force has been maintained in a satisfactory state of efficiency.

BOROUGH of ROCHDALE.

Borough of Rochdale.

Population in 1861 - - - - - -	38,164
Area in acres - - - - - - -	1,131
Number of constables - - - - - -	38
Population to one constable - - - - -	1,004

The only change that has been made in this police force, since the last report, has been caused by the appointment of an additional serjeant, though without any increase of the total strength of the establishment, which, when inspected on the 27th June, was complete, and consisted of a fine looking and, to all appearance, a very effective body of men, remarkably well supplied with clothing and the usual accoutrements all of which were in good serviceable condition.

The books appeared to have been properly kept; and the cells for prisoners were clean, though, for reasons assigned already, they are open to serious objections.

The Inspector is of opinion that this force has been maintained in a satisfactory state of efficiency.

BOROUGH of SALFORD.

Borough of Salford.

Population in 1861 - - - - - -	102,414
Area in acres - - - - - - -	5,209
Number of constables - - - - -	108
Population to one constable - - - -	948

Since the last report there has been a small increase of three men to this police force, which was found complete in number when inspected on the 13th of July. The general appearance and demeanour of the men, and the steadiness and precision with which they executed several military movements, were highly creditable. The clothing and accoutrements were in good serviceable condition; the books seemed to have been remarkably well kept; and the cells for prisoners, which at the town halls of Salford and Broughton are well constructed, were very clean and in good order. Measures have been taken for the erection of a building in the township of Pendleton, suitable for police and other purposes connected with the business of the borough.

The Inspector has the satisfaction to add that, in his opinion, this force has been maintained in a state of efficiency.

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Borough of Warrington.

Borough of Warrington.

Population in 1861	25,953
Area in acres	2,507
Number of constables	28
Population to one constable	927

The police force of this borough has been largely augmented since the last report, there having been an addition of 12 men made to the strength of the establishment on the 6th of April.

The Inspector finding, upon his first visit of inspection on the 24th April, that many of the men had been but a few days in the service, and that they had not yet been supplied with uniform, he determined upon repeating his visit, which was effected on the 1st of July, on which day there were four men required to complete the establishment, several of those recently appointed having in the meantime been discharged from the service. Under these circumstances the Inspector desires to reserve, to a future occasion, any observations it may be his duty to make regarding the general efficiency of this force, or the appearance and demeanour of the men.

In conclusion, the Inspector has now the satisfaction, for the first time, to report that the present authorised strength of this police force is, in his opinion, sufficient for the ordinary duties of the borough.

Borough of Wigan.

Borough of Wigan.

Population in 1861	37,657
Area in acres	2,161
Number of constables	37
Population to one constable	1,017

The police force of this borough was complete in number when inspected on the 4th July, and was found unchanged in strength since the last report. The men presented on the whole a very creditable appearance, and had their clothing and accoutrements in good serviceable condition, and the books appeared to have been properly kept. The Town Council having at length taken measures for the erection of a building suitable for police purposes, the cells for prisoners hitherto in use do not seem to require any further observation than that, considering their actual condition and unfitness, they were as clean as could reasonably have been expected.

The pay of the members of this establishment has recently been increased, that of the chief constable to 200 *l.* a year, that of the inspectors to 81 *l.* 15 *s.* and 77 *l.* 7 *s.* a year respectively, the weekly pay of serjeants to 26 *s.* 3 *d.* and 25 *s.* 1 *d.*, and the weekly pay of constables commencing at 19 *s.* 3 *d.* and rising by gradations to 23 *s.* 4 *d.*

The Inspector is of opinion that this force has, on the whole, been maintained in a fair state of efficiency.

County of
Northumberland.

County of Northumberland.

Population in 1861	186,492
Area in acres	1,230,035
Number of constables	115
Population to one constable	1,621

The constabulary force of this county was inspected between the 2d and 9th of June. At that time there were four men required to complete the establishment, which consisted in the whole of 115 officers and constables (there having been an augmentation of six men since the last report), but of that number one inspector and nine constables have been appointed under the provisions of the Act 3 & 4 Vict. c. 88, s. 19, and three constables are retained at head quarters for the purpose of supplying vacancies as they occur in the several police divisions.

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The clothing and accoutrements of this fine and thoroughly effective body of men were in good serviceable condition; the books appeared to have been well and systematically kept; and those station houses and cells for prisoners which came under inspection were very clean and in good order.

The Inspector has further to report, that, in his opinion, this constabulary force has been maintained in a highly satisfactory state of general efficiency.

Borough of Berwick-upon-Tweed.

Borough of Berwick-upon-Tweed.

Population in 1861 - - - - - - -	13,254
Area in acres - - - - - - - -	8,767
Number of constables - - - - - -	5
Population to one constable - - - - -	2,651

The inspection of this police force was made on the 2d of June, when it appeared that another constable had been added to the establishment a few days previously.

The books seemed to have been well kept; the cells for prisoners, though not by any means upon a good construction, were nevertheless clean and in pretty good order; and the men were well supplied with clothing and the usual accoutrements, which were in good serviceable condition; but the numerical strength of the force is not, in the opinion of the Inspector, sufficient for the proper discharge of the ordinary duties of the borough.

Borough of Morpeth.

Borough of Morpeth.

This borough is consolidated with the county of Northumberland for police purposes.

Borough of Newcastle-upon-Tyne.

Borough of Newcastle-upon-Tyne.

Population in 1861 - - - - - - -	109,291
Area in acres - - - - - - - -	5,336
Number of constables - - - - - -	146
Population to one constable - - - -	748

This police force was inspected on the 10th of June, when it was found to be of the same strength as in the previous year. The number of officers and constables maintained at the cost of the borough is 141, in addition to whom three constables are employed at the expense of Sir W. Armstrong, and two at the expense of Messrs. Hawthorn.

This establishment when inspected was complete, and composed of a fine and, to all appearance a very effective body of men; the clothing and accoutrements were in good serviceable condition; the books seemed to have been well and properly kept; and the men's quarters, which are very commodious and comfortably furnished, were very clean and in good order. The cells for prisoners, the unfitness of which has so frequently been represented, were still in use; but it was stated that the Town Council have it in contemplation to erect a new building for police purposes when a convenient site can be obtained. The two constables who last year were reported to have been employed as "municipal officers" have since been restricted to the discharge of their proper police duties. On the 5th of July, about a month after the inspection, a revised scale for the payment of the police was adopted by the Town Council, of which the following is a copy;

		s.	*d.*	
Inspectors	- - - - - - -	38	6	per week.
	- - - - - - -	37	–	
	- - - - - - -	30	–	
Sub-inspectors	- - - - - -	27	–	
Serjeants	- - - - - - -	25	6	
Detective constables	- - - - -	27	–	
Constables	- - - - - - -	22	6	
	- - - - - - -	21	6	
	- - - - - - -	19	–	

The Inspector is of opinion that this force has, on the whole, been maintained in a satisfactory state of efficiency.

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BOROUGH OF TYNEMOUTH.

Borough of Tynemouth.

Population in 1861	33,991
Area in acres	5,161
Number of constables	34
Population to one constable	999

The police force of this borough, when inspected on the 8th of June, was found to be of the same strength as in the previous year, and consisted of a fine and effective body of men, though it appeared that numerous changes had occurred amongst the ordinary constables, by dismissal and resignation, to the extent of more than one-fourth of the whole establishment.

The men are remarkably well supplied with clothing and the usual accoutrements, all of which were in excellent order; the books seemed to have been well kept; and the cells for prisoners were very clean.

In the opinion of the Inspector this police force has been maintained in a satisfactory state of efficiency.

COUNTY OF YORK, EAST RIDING.

County of York, East Riding.

Population in 1861	131,711
Area in acres	761,168
Number of constables	84
Population to one constable	1,568

There has been no change in the number or organization of this constabulary force since the last report. The inspection was begun on the 3d and completed on the 9th of May, at which time the establishment was complete, and consisted, to all appearance, of a well-selected and effective body of men, well clothed and well supplied with the usual accoutrements, all of which were in good serviceable condition.

The books appeared to have been well kept; and the station-houses (several of which have from time to time been very judiciously enlarged), the charge-rooms, and cells for prisoners were very clean and in good order.

The Inspector has much gratification in reporting that, in his opinion, this force has been maintained in a very satisfactory state of efficiency.

BOROUGH OF BEVERLEY.

Borough of Beverley.

Population in 1861	9,654
Area in acres	2,228
Number of constables	11
Population to one constable	877

In point of numbers the police force of this borough has remained unchanged since the last report. When inspected on the 5th of May the establishment was complete, and presented the appearance of a healthy and effective body of men; their clothing and accoutrements were in good serviceable condition; the books seemed to have been well kept; and the cells for prisoners were clean and in good order.

The Inspector is of opinion that the number of this force is sufficient for the ordinary duties of the borough, and that it has been maintained in a satisfactory state of efficiency.

BOROUGH OF HULL.

Borough of Hull.

Population in 1861 - - - - - -	98,994
Area in acres - - - - - - -	5,123
Number of constables - - - - - -	142
Population to one constable - - - - -	697

The police force of this borough, which consists of a fine and thoroughly effective body of men, when inspected on the 8th of May, was found to be of the same strength as in previous years. The men are well supplied with clothing and the requisite accoutrements, all of which were in good serviceable condition; the books appeared to have been well and methodically kept; and the men's quarters, which are very commodious and sufficiently well furnished, together with the offices, charge-room, and cells for prisoners, were very clean and in good order.

The Town Council, a few days after the inspection, passed a resolution to add 50 *l.* a year to the pay of the chief constable, 4 *s.* a week to the pay of the inspectors, 2 *s.* a week to the pay of the serjeants, and 1 *s.* a week to the pay of the ordinary constables.

The Inspector has pleasure in reporting that, in his opinion, the police force of this borough has been maintained in a highly satisfactory state of efficiency and discipline.

COUNTY OF YORK, NORTH RIDING.

County of York,
North Riding.

Population in 1861 - - - - -	203,807
Area in acres - - - - - - -	1,344,294
Number of constables - - - - -	146
Population to one constable - - - -	1,396

The inspection of the constabulary force of this riding commenced on the 27th of April and was concluded on the 3d of May, at which time it consisted in the whole of 146 officers and constables, having had an augmentation of seven men since the last report. Two serjeants and 15 constables have been appointed under the provisions of s. 19, c. 88, 3 & 4 Vict., and one constable under sect. 20 of the same Act. Three of the constables are retained as a reserve, to supply vacancies as they occur in the several divisions.

This force is, to all appearance, composed of an intelligent and well-chosen body of men, well clothed and supplied with the requisite accoutrements, all of which were in good serviceable condition.

The books seemed to have been well and uniformly kept; and the station-houses, charge rooms, and cells for prisoners were clean and in good order.

The Inspector has the gratification to report that, in his opinion, this constabulary force has been maintained in a highly satisfactory state of discipline and general efficiency.

BOROUGH OF MIDDLESBROUGH.

Borough of
Middlesbrough.

Population in 1861 - - - - - -	18,327
Area in acres - - - - - - -	1,000
Number of constables - - - - - -	37
Population to one constable - - - - -	495

When the police force of this borough was inspected on the 29th of April, it consisted in the whole of 32 men, being five over the strength of last year; early in September there was a further addition of five men, making a total augmentation of 10 men since the last report, bringing up the present strength of the establishment to 37 officers and constables; but, of that number, two serjeants and 12 constables are maintained at the expense of various firms.

No. 2.
Northern District.

This force consists of a fine effective body of men, well clothed and well supplied with the requisite accoutrements, all of which were in good serviceable condition.

The books seemed to have been well kept; and the charge-room, office, and cells for prisoners were sufficiently commodious, clean, and in good order.

The Inspector is of opinion that this establishment has been maintained in a very satisfactory state of efficiency.

BOROUGH of RICHMOND.

Borough of Richmond.

Population in 1861 - - - - - - -	4,290
Area in acres - - - - - - -	2,341
Number of constables - - - - - -	1
Population to one constable - - - - -	4,290

As the population of this borough is not sufficient to entitle it under any circumstances to participate in the annual grant from the Treasury, towards the maintenance of a separate police force, it is almost an act of supererogation to add that, in the opinion of the Inspector, the employment of a single constable, even though he can command the occasional assistance of two municipal officers styled "serjeants at mace," is not sufficient for the ordinary duties of a borough of this extent.

BOROUGH of SCARBOROUGH.

Borough of Scarborough.

Population in 1861 - - - - - -	18,380
Area in acres - - - - - - -	2,586
Number of constables - - - - - -	11
Population to one constable - - - - -	1,671

The inspection of the police force of this borough was made on the 3d of May, at which time the establishment was complete; no change, however, had been made in the number or constitution of the force since the last report.

The men, amongst whom there had been several changes, were well clothed and well supplied with the ordinary accoutrements. A considerable degree of improvement was observable in the manner of keeping the books; and the cells for prisoners, though open to objection on account of their detached position, appeared to be on the whole pretty secure, and were very clean and in good order.

The Inspector has again to report that, in his opinion, this force is not sufficient in number for the ordinary duties of the borough.

COUNTY OF YORK, WEST RIDING.

County of York, West Riding.

Population in 1861 - - - - - -	880,556
Area in acres - - - - - - -	1,650,545
Number of constables - - - - -	618
Population to one constable - - - -	1,424

The inspection of the constabulary force of this riding was begun on the 10th and concluded on the 22d of May, when two men were required to complete the establishment, which, having had an augmentation of 12 men since the last report, consisted in the whole of 618 officers and constables, five of whom had been appointed under the provisions of the Act 3 & 4 Vict. c. 88, s. 19.

This force is composed of a highly effective body of men, well clothed and well supplied with the requisite accoutrements, all of which were in good serviceable condition.

The books seemed to have been well and systematically kept; and the station-houses, charge-rooms, and cells for prisoners were very clean and in good order.

In

In the opinion of the Inspector, this constabulary force has been maintained in a very satisfactory state of discipline and efficiency.

BOROUGH of BRADFORD.

Borough of Bradford.

Population in 1861	106,218
Area in acres	6,590
Number of constables	119
Population to one constable	892

The inspection of the police force of this borough was made on the 16th May, when the establishment was complete and found to be of the same numerical strength as in the previous year, but apparently slightly altered in respect of its organisation by a reduction of the number of sergeants from 12 to 11.

The men generally presented a creditable appearance, and are fairly supplied with the usual articles of clothing, with the exception of boots, in lieu of which they are allowed the small sum of 15 *s.* 6 *d.* per man per annum, paid half yearly.

The office, charge room, and cells for prisoners are sufficiently commodious, and were clean and in good order.

This force, in the opinion of the Inspector, has, on the whole, been maintained in a satisfactory state of efficiency.

BOROUGH of DEWSBURY.

Borough of Dewsbury.

Population in 1861	18,148
Area in acres	1,335
Number of constables	10
Population to one constable	1,814

This police force was inspected on the 13th May, when it was found to be the same in point of numbers as in previous years, which, in the opinion of the Inspector, is not sufficient for the ordinary duties of the borough.

BOROUGH of DONCASTER

Borough of Doncaster.

Population in 1861	16,430
Area in acres	1,879
Number of constables	16
Population to one constable	1,027

The police force of this borough has had an augmentation of one man since the last report, and when inspected on the 26th April, the establishment was found complete and well supplied with clothing and the customary accoutrements, all of which were in good serviceable condition.

The books seemed to have been properly kept, and the cells for prisoners were clean and in good order.

The Inspector is of opinion that this force is sufficient in number for the ordinary duties of the borough, and that it has been maintained in a satisfactory state of efficiency.

BOROUGH of HALIFAX.

Borough of Halifax.

Population in 1861	37,015
Area in acres	990
Number of constables	37
Population to one constable	1,000

The inspection of the police force of this borough was made on the 17th May, at which time the establishment was complete, and presented the appearance of a smart

No. 2. Northern District.

a smart and effective body of men, well supplied with clothing and the requisite accoutrements, all of which were in good condition.

The books seemed to have been properly kept, and the office, charge room, and cells for prisoners (which last, as already reported, are somewhat injudiciously constructed) were very clean and in good order.

On hearing that two of the officers were required to collect tolls and rents, the Inspector felt himself called upon to point out that such employment of police officers appeared to be incompatible with their proper duties, upon which an assurance was given that the practice should be discontinued.

A communication has since been received from the superintendent, dated 26th July, stating that three weeks previously the Watch Committee had appointed two officers in place of those who were employed in collecting market rents, &c.

The Inspector is of opinion that this force has been maintained in a highly satisfactory state of efficiency.

Borough of Huddersfield.

Borough of Huddersfield.

Population in 1861 - - - - - -	22,141
Area in acres - - - - - - -	700
Number of constables - - - - - -	31
Population to one constable - - - - -	711

The inspection of this police force was made on the 19th May, when there was one man required to complete the establishment, which, in point of number and organisation, had remained unchanged since the last report.

The men presented a very creditable and healthy appearance, the clothing and accoutrements were in good condition, the books on the whole seemed to have been well kept, and the cells for prisoners, though not entirely free from objection on grounds already assigned, were very clean.

In the opinion of the Inspector, this force has been maintained in a satisfactory state of efficiency.

Borough of Leeds.

Borough of Leeds.

Population in 1861 - - - - - -	207,153
Area in acres - - - - - - -	19,221
Number of constables - - - - -	263
Population to one constable - - - -	787

Though there has been no alteration of the authorized strength of the police force of this borough since the last report, there seems to have been a change in its organisation, as when inspected on the 18th of May, it was found to consist of one chief constable, two superintendents, five inspectors, six sub-inspectors, 25 sergeants, and 224 constables, five of whom are employed as detectives. This arrangement differs from that heretofore in operation, by the promotion of two of the officers to the rank of superintendent, the reduction of one in the number of inspectors, and an addition of one sub-inspector or sergeant.

This force is composed, to all appearance, of a well selected and very effective body of men, well clothed and well supplied with the requisite accoutrements, all of which were in excellent condition.

With the exception of one (Kirkstall), all the outlying stations are now provided with cells for the temporary confinement of prisoners, though the cell at Bramley is of a very indifferent description, still it is better than none.

The Inspector has much gratification in reporting that this establishment has in all respects been maintained in a very satisfactory state of discipline and efficiency.

BOROUGH of PONTEFRACT.

Borough of Pontefract.

Population in 1861	5,340
Area in acres	1,860
Number of constables	5
Population to one constable	1,068

The inspection of the police force of this borough, which, though few in number, seems to consist of a steady and effective body of men, was made on the 12th of May, when it was found complete, and of the same strength as in former years.

The men are remarkably well supplied with clothing and the usual accoutrements, all of which were in good serviceable condition,

The books appeared to have been properly kept, and the charge-room and cells for prisoners, which are sufficiently commodious, were very clean, and in good order.

This police force, in the opinion of the Inspector, is sufficient in number for the ordinary duties of the borough, and has been maintained in a satisfactory state of efficiency.

BOROUGH of RIPON.

Borough of Ripon.

Population in 1861	6 172
Area in acres	1,446
Number of constables	2
Population to one constable	3,086

The inspection of this police force was made on the 22d May, when it was found to be of the same strength as in all previous years; the Inspector, therefore, has again to report that in his opinion the number of men employed is not sufficient for the ordinary duties of the borough.

BOROUGH of SHEFFIELD.

Borough of Sheffield.

Population in 1861	185,157
Area in acres	22,830
Number of constables	241
Population to one constable	768

When the police force of this borough was inspected on the 25th of April, it was found to have had an augmentation, bringing up the total strength of the establishment to 241 officers and constables, of whom 209 were assembled for inspection, 18 were returned on duty, eight were reported sick, three on leave of absence, and three were required to make up the full complement.

The men assembled for inspection presented an appearance of much smartness and general intelligence, they were abundantly supplied with clothing and the requisite accoutrements, all of which appeared to be in good serviceable condition.

The books also seemed to have been well and properly kept.

Measures have been taken, and are now in full operation for the erection, on an approved plan, of a series of cells for the temporary confinement of prisoners; no further observations, therefore, are needed in respect of those hitherto in use.

As in November and December last a considerable number of men were required to complete this establishment, it seems to have been found expedient on the 1st of January of this year to increase the pay of the ordinary constables by an addition of one shilling a week, from which date the ranks appear to have been gradually filled during the succeeding three months, until, as above stated, there were only three men wanting to complete on the day of inspection.

The inspector is gratified, after so long an interval, in reporting that in his opinion the authorised strength of this police force is now sufficient for the ordinary duties of the borough.

No. 2.
Northern District.

Borough of Wakefield.

Borough of Wakefield.

Population in 1861	23,181
Area in acres	630
Number of constables	28
Population to one constable	828

This police force, when inspected on the 13th May, was complete in number, and found to have had an addition of one man since the last report.

The men are well supplied with clothing and the usual accoutrements, which in general seemed to be in good serviceable condition; the books appeared to have been pretty well kept, but one or two of the cells for prisoners indicated much dampness, and in their then condition were dangerous to health, and unfit for use.

In the opinion of the Inspector this force has been maintained in a satisfactory state of efficiency.

Borough of York.

Borough of York.

Population in 1861	40,377
Area in acres	2,720
Number of constables	40
Population to one constable	1,009

The inspection of the police force of this city was made on the 27th April, when three men were required to complete the establishment, which, in point of number, had remained unchanged since the last report.

This force consists of a fine, smart-looking body of men, remarkably well clothed, and well supplied with the ordinary accoutrements, all of which were in good serviceable condition.

The books appeared to have been properly kept, and the office, charge-rooms, and cells for prisoners were very clean, and in good order.

The same difficulty that has been observed elsewhere of retaining men in the service seems to exist here, as since the last report numerous changes have taken place among the ordinary constables, caused by dismissals and resignations.

The Inspector is of opinion that on the whole this police force has been maintained in a satisfactory state of efficiency.

RETURN showing the authorised Strength of the several CONSTABULARY and POLICE FORCES in the Northern District, including the additional Constables appointed at the Expense of Companies and Private Persons, in each Year, from 1856 to 1865, inclusive.

Number.	Counties and Boroughs.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.
1	Cheshire - - -	169	173	201	203	214	216	224	224	231	235
2	Birkenhead - -	27	41	41	57	57	57	59	78	85	95
3	Chester - - -	29	33	33	33	33	33	36	36	36	36
4	Congleton - -	3	3	3	4	4	5	5	5	5	6
5	Macclesfield - -	18	18	18	18	18	16	16	16	17	17
6	Stalybridge - -	11	11	11	11	11	11	15	25	25	25
7	Stockport - -	15	15	15	15	15	15	15	15	15	15
8	Cumberland and Westmorland.	74	108	108	115	116	116	113	116	120	141
9	Carlisle - - -	24	29	29	29	29	29	29	29	31	31
10	Kendal - - -	5	5	4	4	4	4	5	5	5	5
11	Durham - - -	181	199	201	204	206	212	228	229	266	276
12	Durham (City) -	8	8	8	11	10	10	13	13	13	13
13	Gateshead - -	22	22	26	26	26	26	33	33	33	33
14	Hartlepool - -	5	9	9	9	9	9	12	12	12	12
15	South Shields - -	17	28	28	28	28	28	35	35	35	35
16	Sunderland - -	64	65	65	66	66	66	80	80	80	80
17	Lancashire - -	644	657	666	674	688	707	729	739	763	779
18	Ashton-under-Lyne -	19	21	21	21	21	21	21	23	23	23
19	Blackburn - -	29	29	29	29	34	34	34	34	38	38
20	Bolton - - -	27	27	31	31	31	31	38	38	38	40
21	Lancaster - -	10	10	14	14	14	14	13	13	13	13
22	Liverpool - -	886	956	973	982	1,002	1,002	1,002	1,002	1,030	1,052
23	Manchester - -	524	554	605	604	617	657	671	671	671	670
24	Oldham - - -	22	22	24	25	26	29	58	59	52	54
25	Preston - - -	38	40	42	40	44	44	52	82	82	82
26	Rochdale - -	17	18	18	18	18	22	23	23	38	38
27	Salford - - -	91	95	95	99	99	105	104	105	105	108
28	Warrington - -	11	12	12	11	13	13	12	13	16	28
29	Wigan - - -	23	32	32	32	32	32	32	37	37	37
30	Northumberland -	61	61	92	96	95	95	107	109	109	115
31	Berwick - - -	4	4	4	4	4	4	4	4	4	5
32	Newcastle-on-Tyne -	107	107	107	120	120	120	140	143	146	146
33	Tynemouth - -	19	30	30	30	30	33	33	33	34	34
34	York, East Riding -	70	69	80	80	80	81	83	84	84	84
35	Beverley - - -	1	1	1	1	1	1	11	11	11	11
36	Hull - - -	101	122	122	122	122	142	142	142	142	142
37	York, North Riding -	103	105	115	118	120	123	123	130	139	146
38	Middlesbrough - -	7	13	13	13	13	15	19	20	27	37
39	Richmond - -	1	2	2	1	1	1	1	1	1	1
40	Scarborough - -	5	6	6	6	7	8	11	11	11	11
41	York, West Riding -	487	487	529	539	545	550	578	579	606	618
42	Bradford - - -	111	114	116	119	119	119	119	119	119	119
43	Dewsbury - -	–	–	–	–	–	–	–	10	10	10
44	Doncaster - -	10	13	13	13	13	13	13	15	15	16
45	Halifax - - -	29	35	35	35	36	36	37	37	37	37
46	Huddersfield - -	26	29	30	30	32	32	30	31	31	31
47	Leeds - - -	147	221	221	221	228	228	228	256	263	263
48	Pontefract - -	2	2	4	4	5	5	5	5	5	5
49	Ripon - - -	2	2	2	2	2	2	2	2	2	2
50	Sheffield - - -	143	176	180	191	191	191	191	216	231	241
51	Wakefield - -	15	15	15	15	24	25	25	25	27	28
52	York - - -	31	37	37	37	37	37	40	40	40	40
	TOTAL in each Year - -	4,498	4,891	5,116	5,210	5,310	5,425	5,649	5,813	6,009	6,159
	ANNUAL INCREASE - -	–	393	225	94	100	115	224	164	196	150

J. Woodford, Lieut.-Colonel, Inspector.

No. 3.
h of England
South Wales
District.

No. 3.—SOUTH OF ENGLAND AND SOUTH WALES DISTRICT.

NINTH ANNUAL REPORT of Captain *Edward Willis*, Her Majesty's INSPECTOR of the CONSTABULARY and BOROUGH POLICE FORCES of the SOUTHERN COUNTIES of *England* and *South Wales*, for the Year ended the 29th September 1865.

Sir,

I HAVE the honour, in presenting this my Ninth Report on the state of the different county and borough police establishments in the south police district, to state for your information that the police forces which have on previous occasions been reported as efficient, continue in a satisfactory state. That in several instances where buildings and population have been increasing, augmentations of the police have been made to meet the necessity for additional protection, and that new police stations have also been erected in many places where such requirements were found to be wanting. Of the boroughs which have populations exceeding 5,000 persons, and which have heretofore maintained inefficient police forces, one only, viz. Neath, in Glamorganshire, has made any satisfactory addition during the year to the number of the police, and in this borough the increase was only made at the close of the financial year, late in September, so that for the past year the police force is necessarily placed in the category of those establishments which have been maintained in an inefficient state.

Of the small boroughs having populations of less than 5,000 inhabitants, one, viz. Bradninch, in Devonshire, has united with the county both for police as well as general purposes; and in Hampshire negotiations for the consolidation of the police of the borough of Romsey with that of the constabulary of the county have been concluded, and will shortly be carried into effect.

In some of the larger police establishments in which the constables are divided into several classes, it has been customary to place the larger number of constables in the lower classes, thereby offering but little chance of speedy advancement either in pay or promotion to a large majority of the men; lately, however, it has been found desirable to alter this arrangement, and in some instances also to grant a general increase of pay, as much difficulty has been experienced not only in retaining men in the service but also in obtaining eligible candidates for appointment as constables.

In those forces which have been established some years, the claims on the Superannuation Funds are now beginning to be felt, and no doubt will annually increase, and probably eventually to such an extent as to exceed the annual receipts.

If it should be deemed desirable to preserve such funds, and save the ratepayers as much as possible from the charges for superannuation allowances, I think it would be advisable to secure the capital of such funds, not only from being touched, but also to add to the capital every year a certain fixed portion of the interest arising therefrom, or from the general receipts in aid of such funds.

By such means the capital would annually increase, and the income in time would probably become large enough to support the claims for retiring allowances without any heavy demands having to be made on the ratepayers.

As respects the state of crime in the district, I am able to report a decrease in indictable offences; for offences, however, which are determined summarily many more persons have been proceeded against than in the previous year. The particulars relating to such offences, and the results of trial, together with other information as to the state of vagrancy, the number and conduct of public houses and beer houses, &c., are given in a tabular form in a return which will be found placed at the end of the report.

With respect to the working of the late Penal Servitude Amendment Act, which require convicts liberated on licenses of leave to report themselves periodically to the police, I am glad to state, from the information which I have received from the officers in command of the various police establishments, that the Act is working well, and that a large number of the convicts who have been liberated under the provisions of the Act are now in active work, and that with very few exceptions most of them have reported themselves regularly.

No. 3.
South of England and South Wales District.

Of 447 persons of this class who have come to reside in the district, four males are reported to have absconded or left their places of residence without having given notice of removal, eight males and two females are reported to have been recommitted for breach of the rules of their license, and 32 males and one female recommitted for having committed fresh offences.

Of the others, 129 are stated to have left under proper notice to reside elsewhere, and 138 to have been in employment, and the licenses of 132 are reported to have expired.

I append as usual, for the convenience of reference, a table of the boroughs arranged according to the state of efficiency or inefficiency of their respective police establishments.

I have, &c.
(signed) *Edward Willis*,
Her Majesty's Inspector of Constabulary,
South Police District.

To the Right Honourable Sir George Grey, Bart., M.P., &c.,
Her Majesty's Principal Secretary of State for
the Home Department.

TABLE of MUNICIPAL BOROUGHS in the South Police District, arranged according to the state of Efficiency or Inefficiency of their respective Police Establishments.

BOROUGHS consolidated for Police purposes with the Constabulary of their respective Counties whose Police Forces are reported to be in an EFFICIENT state.

Wallingford.
Dartmouth.
Honiton.
Bridport.
Lyme Regis.
Shaftesbury.
Gloucester City.
Tewkesbury.
Andover.
Lymington.
Glastonbury.
Wells.
Yeovil.
Calne.
Chippenham.
Devizes.
Marlborough.
Aberystwith.
Cardigan.
Aberavon.
Pembroke.

BOROUGHS having independent Police Establishments the Populations of which respectively exceed 5,000 Persons, and whose Police Forces are reported to have been maintained during the Year in an EFFICIENT state.

Abingdon.
Newbury.
Reading.
Windsor.
Barnstaple.
Devonport.
Exeter.
Plymouth.
Dorchester.
Poole.
Weymouth.
Bristol.
Portsmouth.
Southampton.
Winchester.
Hereford.
Leominster.
Canterbury.
Deal.
Dover.
Faversham.
Folkstone.
Gravesend.
Maidstone.
Margate.
Ramsgate.
Rochester.
Tonbridge Wells.
Monmouth.
Newport.
Bath.
Guildford.
Reigate.
Brighton.
Hastings.
Hove.
Chichester.
Salisbury.
Carmarthen.
Cardiff.
Swansea.

BOROUGHS having independent Police Establishments the Populations of which respectively exceed 5,000 Persons, but whose Police Forces are reported to have been maintained during the Year in an INEFFICIENT state.

Falmouth.
Penzance.
St. Ives.
Truro.
Bideford.
Tiverton.
Newport, Isle of Wight.
Bridgwater.
Brecon.
Neath.
Haverfordwest.

SMALL BOROUGHS having independent Police Establishments, but with Populations of less than 5,000 Persons.

Maidenhead.
Bodmin.
Helston.
Launceston.
Liskeard.
Penryn.
Southmolton.
Torrington.
Totnes.
Blandford.
Basingstoke.
Romsey.
Hythe.
Sandwich.
Tenterden.
Chard.
Godalming.
Rye.
Arundel.
Tenby.

No. 8.
South of England and South Wales District.

County of Berks, including the Borough of Wallingford.

BERKSHIRE.

Force - - - - - - 114 persons.

Area in acres - - -	442,022	Acres to each constable - -	3,877
Population in 1861 - -	125,955	Population to ditto, as per census 1861,	1,104

RANKS.	Yearly Pay in £. and Shillings.											Weekly Pay in Shillings and Pence.									
		Superintendents. Total No. - - 8.					Inspectors. Total No. - 2.				Serjeants. Total No. - 12.				Constables. Total No. - 91.						
	Chief Constable.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	3	2	3	–	–	2	–	–	–	1	11	–	–	31	30	30			
Rates of Pay of each, ditto	£. 400	£. 100	£. 90	£. 80	–	–	£. 70	–	–	–	s. 25	s. 23	–	–	s. 21	s. 19	s. 17			

Chief constable.—Horse and travelling allowance, 150 *l.*
Superintendents.—Horses, forage, carts, stabling, &c., provided.

In this county a progressive scale of pay has been established for each rank and class according to stated periods of service, and some changes have been made during the year in the number of the classes of the constables, which will tend to afford to the men more frequent chances of advancement in pay; the total number of the force has, however, undergone no alteration.

Superintendents, after five years' service in such rank, will receive an addition of 6 *l.* yearly, after 10 years 13 *l.* ditto, and after 15 years 20 *l.* ditto.

Inspectors, after five years' service in such rank, will receive an addition of 5 *l.* yearly, after 10 years 10 *l.* ditto, and after 15 years 15 *l.* ditto.

Serjeants, after three years' service in such rank, will receive an addition or 1 *s.* per week, and after seven years 2 *s.* ditto.

First-class constables, after three years' service in such class, will receive an addition of 1 *d.* per diem, and after seven years ditto 2 *d.* per diem.

In addition to the ordinary pay, pecuniary allowances are also granted to those officers and constables who are appointed to act as inspectors of nuisances, low lodgings, and weights and measures, and as assistant relieving officers.

In indictable offences there has been a considerable decrease during the year, and fewer persons have been committed for trial; for offences also which are determined summarily, considerably fewer persons have been proceeded against than in the previous year.

As respects vagrants, the number who have been passed by the police to the union is stated to have amounted to 6,915 persons.

The station houses are all in a cleanly and satisfactory state.

The duties are well arranged and satisfactorily provided for, and I consider the force to be in an efficient state.

Borough of Abingdon.

BOROUGH OF ABINGDON.

Force - - - - - - 6 persons.

Area in acres - - - - -	340	Acres to each constable - - -	57
Population in 1861 - - -	5,680	Population to ditto, as per census 1861,	946

RANKS.	Yearly Pay in £. and Shillings.											Weekly Pay in Shillings and Pence.									
		Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 4.						
	Head Constable or Chief Superintendent.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	1	–	–	–	4					
Rates of Pay of each, ditto	£. 91	–	–	–	–	–	–	–	–	–	s. 21	–	–	–	s. 17					

In

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South of England and South Wales District.

In this borough the police force has undergone no change during the year.

The cells, which I reported to be deficient of light and ventilation, have undergone no alteration; I understand, however, that a project for the erection of a house for the town serjeant, in which cells are to be added, has been under the consideration of the borough authorities.

The indictable offences which are reported to have taken place are more in number than in the previous year, and more persons have been apprehended and committed for trial; for offences also which are determined summarily, more persons have been proceeded against.

The duties are generally satisfactorily provided for, and I consider the force to be efficient.

BOROUGH of MAIDENHEAD.

Borough of Maidenhead.

Force - - - - - 3 persons.

Area in acres - - - -	2,560	Acres to each constable - - -	853
Population in 1861 - - -	3,895	Population to ditto, as per census 1861,	1,286

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 2.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2					
Rates of Pay of each, ditto	£. s. 72 12	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 20					

No alteration had taken place, up to the date of my last inspection, in the number or pay of this force.

The cells are in an isolated building, and the access to two of them is up a dangerous flight of steps.

The indictable offences which have been reported are considerably more in number than in the previous year, and more persons have been apprehended and committed for trial; and also considerably more persons proceeded against for offences which are determined summarily.

The duties are not effectively provided for, and the area is too extensive to be properly patrolled and watched by so small a force.

BOROUGH of NEWBURY.

Borough of Newbury.

Force - - - - - 8 persons.

Area in acres - - - -	1,722	Acres to each constable - - -	215
Population in 1861 - - -	6,161	Population to ditto, as per census 1861,	770

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 6.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	5	1				
Rates of Pay of each, ditto	£. s. 81 18	-	-	-	-	-	-	-	-	-	s. 21	-	-	-	s. 17	s. 7				

No alteration has taken place during the year in the number or pay of the police of this borough.

The cells are maintained in a cleanly state.

More indictable offences are reported to have taken place than in the previous

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year, and more persons have been apprehended for such offences; but fewer persons committed for trial.

For offences which are determined summarily, fewer persons have been proceeded against.

The number of vagrants who have been passed by the police to the union during the year are stated to have amounted to 1,572 persons.

The duties are generally well provided for, and I consider the force to be efficient.

BOROUGH of READING.

Borough of Reading.

Force - - - - - - 32 persons.

Area in acres - - - - 1,922 | Acres to each constable - - - 60
Population in 1861 - - - 25,045 | Population to ditto, as per census 1861, 782

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 3.				Serjeants. Total No. - 5.				Constables. Total No. - 23.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	1	1	1	–	5	–	–	–	7	8	8			
Rates of Pay of each, ditto -	£. 130	–	–	–	–	–	£. s. 67 12	£. 65	£. s. 62 8	–	s. 22	–	–	–	s. 20	s. d. 18 6	s. 17			

In this borough an alteration has been made in the pay of the head constable and inspectors; but in other respects the force has undergone no change.

The station and cells are maintained in a cleanly and satisfactory state.

In indictable offences there has been a decrease during the year; but rather more persons have been committed for trial, and also more persons proceeded against summarily.

The night beats are in consequence of the extension of the town longer than is desirable; I have, however, been informed that the subject will receive the attention of the borough authorities, and in order to give additional protection for the present, by night two men are placed on duty in plain clothes as patrols; in all other respects the duties appear to be well arranged, and the force to be worked efficiently.

BOROUGH of WINDSOR.

Borough of Windsor.

Force - - - - - - 13 persons.

Area in acres - - - - 2,890 | Acres to each constable - - - 222
Population in 1861 - - - 9,520 | Population to ditto, as per census 1861, 732

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 2.				Constables. Total No. - 10.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	1	1	–	–	10					
Rates of pay of each, ditto -	£. s. 83 4	–	–	–	–	–	–	–	–	–	s. 20	s. 19	–	–	s. 18					

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No alteration had taken place in the number or pay of the police force of this borough up to the date of my last inspection.

The indictable offences which have been reported are rather more in number than in the previous year, and more persons have been apprehended, but only one more person committed for trial; for offences, however, which are determined summarily, considerably more persons have been proceeded against.

The station and cells are maintained in a satisfactory state, and the duties are properly provided for, and I consider the force to be efficient.

CORNWALL.

County of
Cornwall.

Force - - - - - 191 persons.

Area in acres - - - -	863,077	Acres to each constable - - -	4,518
Population in 1861 - - -	316,568	Population to ditto, as per census 1861,	1,657

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - 7.					Inspectors. Total No. - 10.				Serjeants. Total No. - 18.				Constables. Total No. - 155.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	3	3	-	-	10	-	-	-	1	17	-	-	48	107				
Rates of Pay of each, ditto -	£. 350	£. 125	£. 95	£. 85	-	-	£. 65	-	-	-	s. 23	22	-	-	s. 20	s. 18				

Chief Constable.—Horse and travelling allowances, 150 *l.*
Superintendents.—Horses, forage, carts, stabling, &c., provided.

In this force a progressive scale of pay has been established for each rank according to stated periods of service, but in other respects the force has undergone no alteration during the year.

Superintendents, after five years' service in such rank, receive an increase of 6 *l.* per annum, after 10 years 12 *l.* per annum, and after 15 years 18 *l.* per annum.

Inspectors, after five years' service in such rank, receive an increase of 4 *l.* per annum, after 10 years 8 *l.* per annum, and after 15 years 12 *l.* per annum.

Serjeants, after five years' service as serjeant, receive an increase of 1 *s.* per week, and after 10 years' service 2 *s.* per week.

First-class constables, after three years' service as first-class constables, receive an increase of 1 *d.* per diem, and after seven years' service 2 *d.* per diem.

Second-class constables, after five years' service, receive an increase of 1 *d.* per diem.

No extra remuneration is granted to members of this force who act as inspectors of nuisances, low lodgings, weights and measures, or as assistant relieving officers, or who are appointed to any other offices.

The indictable offences which have been reported are rather more in number than in the previous year, and more persons have been committed for trial, and proceeded against summarily.

As respects vagrants, the number who were passed by the police to the unions during the year are stated to have amounted to 143 persons.

One new police station has been erected during the year at Blue Anchor, and others are in the course of building at Bodmin (for the head quarters), and at Callington; all the other stations are maintained in excellent order.

The duties are well provided for, and I consider the force to be in an efficient state.

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South of England
and South Wales
District.

Borough of
Bodmin.

BOROUGH OF BODMIN.

Force - - - - 1 person.

Area in acres - - - - 2,784 | Acres to each constable - - - 2,784
Population in 1861 - - - 4,466 | Population to ditto, as per census 1861, 4,466

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Supeintendents.					Inspectors.				Serjeants.				Constables.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1																			
Rates of Pay of each, ditto -	£. 18																			

No alteration has taken place during the year in the police arrangements of this borough.

There is no properly organized police force, and the borough, which extends over a very considerable area, is almost altogether without any effective police supervision.

No return of crime has been furnished.

BOROUGH OF FALMOUTH.

Borough of
Falmouth.

Force - - - - 4 persons.

Area in acres - - - - 40 | Acres to each constable - - - 10
Population in 1861 - - - 5,709 | Population to ditto, as per census 1861, 1,427

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 3.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	–	–	–	–	2	1				
Rates of Pay of each, ditto -	£. 55	–	–	–	–	–	–	–	–	–	–	–	–	–	s. 21	s. 18				

In this borough the police arrangements have undergone no change during the year; a project, however, has been under consideration for uniting the police with that of the county, but the arrangements have not been perfected.

The indictable offences which have been reported are more in number than in the previous year, and more persons have been apprehended and committed for trial; for offences also, which are determined summarily, more persons have been proceeded against.

The duties are not effectively provided for, and the force is insufficient in number.

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South of England,
and South Wales
District.

Borough of Helston.

Borough of
Helston.

Force - - - - 1 person.

Area in acres - - - - - 292 | Acres to each constable - - - 292
Population in 1861 - - - - 3,843 | Population to ditto, as per census 1861, 3843

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1					
Rates of Pay of each, ditto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 20					

There is no properly organized police force in this borough.

The cells, which are situated beneath the Town Hall, and which were reported to be unfit for the detention of prisoners, will in future not be used, as the cells in the borough gaol, which is to be discontinued as a prison, will be granted by the borough authorities, I am informed, for the use of the police for the temporary confinement of prisoners.

The Act requiring a superannuation fund to be established has not been complied with.

No indictable or other offences are reported to have taken place.

Borough of Launceston.

Borough of
Launceston.

Force - - - - 1 person.

Area in acres - - - - 2,880 | Acres to each constable - - - 2,880
Population in 1861 - - - 2,790 | Population to ditto, as per census, 1861, 2,790

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class	6th Class.
Number of each Rank and Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1					
Rates of Pay of each, ditto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 21					

The police arrangements of this borough have undergone no alteration, and I have consequently again to report the borough as being without a sufficient number of police for the protection of district comprised within its limits.

No return of crime has been furnished.

No. 3.
South of England
and South Wales
District.

Borough of
Liskeard.

BOROUGH of LISKEARD.

Force - - - - 2 persons.

Area in acres - - - -	810	Acres to each constable - -	405
Population in 1861 - - -	4,689	Population to ditto, as per census 1861,	2,344

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 2.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2					
Rates of Pay of each, ditto -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 20					

In this borough the police arrangements have undergone no change during the year.

The indictable offences which have been reported are more in number than in the previous year, and more persons have been apprehended and committed for trial, and also more persons proceeded against for offences which are determined summarily.

The duties are not effectually provided for, and more men are required to maintain a proper supervision of the town by day and by night.

Borough of
Penryn.

BOROUGH of PENRYN.

Force - - - - 2 persons.

Area in acres - - - -	298	Acres to each constable - -	149
Population in 1861 - - -	3,547	Population to ditto, as per census 1861,	1,773

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 2.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2					
Rates of Pay of each, ditto -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 21					

No alteration has taken place in the police arrangements of this borough during the year.

The return of crime as compared with that of the previous year exhibits an increase in indictable offences, and more persons have been apprehended and committed for trial; for offences, however, which are determined summarily, fewer persons have been proceeded against.

The force is too small in number to maintain a proper supervision of the town by day and by night.

BOROUGH

No. 3.
South of England and South Wales District.

Borough of Penzance.

Borough of Penzance.

Force - - - - 7 persons.

Area in acres - - - - 440 | Acres to each constable - - 62
Population in 1861 - - - 9,414 | Population to ditto, as per census 1861, 1,347

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 5.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	1	–	–	–	4	1				
Rates of Pay of each, ditto -	£. s. 34 2	–	–	–	–	–	–	–	–	–	s. d. 21 6	–	–	–	s. d. 18 6	s. d. 17 6				

In this borough a progressive scale of pay has been established, but the number of the police has not been increased.

The head constable, after five years' service, receives an addition of 4*l.* per annum; after 10 years' 8*l.* additional; and after 15 years' 12*l.* additional.

The serjeant, after five years' service, receives an addition of 1*s.* per week, and after 10 years' 2*s.* per week.

First-class constables, after three years' service, receive an addition of 1*d.* per diem; and after seven years' 2*d.* per diem.

Second-class constables, after five years' service, receive an addition of 1*d.* per diem.

In indictable offences there has been a considerable decrease during the year, and rather fewer persons have been apprehended and committed for trial; and also fewer persons proceeded against for offences which are determined summarily.

The police force is too limited in number to provide for the proper supervision and protection of the borough by day and by night.

Borough of St. Ives.

Borough of St. Ives.

Force - - - - 1 person.

Area in acres - - - - 1,876 | Acres to each constable - - 1,876
Population in 1861 - - - 7,027 | Population to ditto, as per census 1861, 7,027

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1																			
Rates of Pay of each, ditto -	£. d. 40 6												–							

In this borough there is no properly organized police force, and the district surrounding the town, which is very extensive, may be said to be left entirely without any police supervision or protection.

One indictable offence is reported to have been committed, and 79 persons were proceeded against for offences which are determined summarily.

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BOROUGH of TRURO.

Force - - - - - 6 persons.

Borough of Truro.

Area in acres - - - -	1,103	Acres to each constable - -	183
Population in 1861 - - -	11,337	Population to ditto, as per census 1861,	1,889

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 4.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	1	–	–	–	4					
Rates of Pay of each, ditto -	£. 78	–	–	–	–	–	–	–	–	–	s. 21	–	–	–	s. d. 17 6					

The police force of this borough has undergone no change during the year, either in numbers or pay.

Constables enter the service at 16 *s.* 6 *d.* per week, and after one year's service rise to 17 *s.* per week.

The indictable offences which have been reported are about the same as in the previous year, and the same number of persons have been committed for trial; for offences, however, which are determined summarily, rather more persons have been proceeded against.

The duties are not effectively provided for, and the force is insufficient in number to provide for the proper watching and supervision of the borough by day and by night.

DEVONSHIRE.

Force - - - - - 334 persons.

County of Devon, including the boroughs of Dartmouth and Honiton.

Area in acres - - - -	1,616,717	Acres to each constable - -	4,840
Population in 1861 - -	399,535	Population to ditto, as per census 1861,	1,196

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										
	Head Constable or Chief Superintendent.	Superintendents. Total No. - 14.					Inspectors.				Serjeants. Total No. - 34.				Constables. Total No. - 285.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	6	6	1 Clerk	–	–	–	–	–	24	10	–	–	57	146	82			
Rates of Pay of each, ditto -	£. 400	150	£. s. 103 6	£. s. 88 6	£. 91	–	–	–	–	–	s. 23	s. 20	–	–	s. 20	s. 18	s. 16			

Chief Constable.—Horse and travelling allowance, 200 *l.*
Superintendents.—Provide their own horses and are allowed 45 *l.* each for keep, &c., and 2 *l.* 14 s. for stationery.

No alteration has taken place during the year in the number of the police force of this county, but the pay and allowances have undergone revision and alteration:

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alteration: the scale of pay, however, which has been adopted for each class is of a fixed character, and not progressive for length of service.

In addition to the ordinary pay, pecuniary allowances are also granted to those officers and constables who are appointed to act as inspectors of nuisances and as examiners of weights and measures.

One new police station (at Hatherleigh) has been completed, and is now in the occupation of the police.

The station-house at Ilfracombe is in a very unsound state, and requires rebuilding; and better accommodation, both for the police as well as prisoners, is required in Torquay and Kingsbridge; indeed, the cells in the latter place are quite unfit for the detention of prisoners, being both badly ventilated and almost totally dark.

The indictable offences which have been reported are 76 less in number than in the previous year; but 22 more persons have been apprehended and eight more persons committed for trial; for offences which are determined summarily 490 more persons have been proceeded against.

As respects vagrants the number who have been passed by the police to lodging-houses and the unions are stated to have amounted to 2,270 persons.

The duties appear to be satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH of BARNSTAPLE.

Force - - - - - 10 persons.

Borough of Barnstaple.

Area in acres - - - - -	2,549	Acres to each constable - - -	254
Population in 1861 - - -	10,743	Population to ditto, as per census, 1862,	1,074

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 8.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	1	–	–	–	1	7				
Rates of Pay of each, ditto -	£. s. 118 10	–	–	–	–	–	–	–	–	–	s. d. 23 11	–	–	–	s. 17	s. d. 16 1				

No alteration has taken place during the year in the number or pay of this force.

The indictable offences which have been reported are considerably less in number than in the previous year, and fewer persons have been apprehended and committed for trial. For offences also which are determined summarily, fewer persons have been proceeded against.

The number of vagrants who were passed by the police to lodging-houses and the union amounted to eight persons.

The duties appear to be generally well provided for, and I consider the force to be in an efficient state.

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Borough of
Bideford.

BOROUGH of BIDEFORD.

Force - - - - - 2 persons.

Area in acres - - - -	4,510	Acres to each constable - - -	2,255
Population in 1861 - - -	5,742	Population to ditto, as per census 1861,	2,871

RANKS.	Head Constable or Chief Superintendent.	Yearly Pay in £. and Shillings.									Weekly Pay in Shillings and Pence.									
		Superintendents. Total No. - - 1.					Inspectors.				Serjeants.				Constables. Total No. - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1					
Rates of Pay of each, ditto -	-	£. s. 72 16	-	-	-	-	-	-	-	-	-	-	-	-	s. 18					

The subject of augmenting the police force of this borough has been under the consideration of the town council, but as yet nothing has been done to place the force in a more efficient state.

The indictable offences which have been reported, although small in number, are more than in the previous year, as also are the apprehensions for such offences, but the committals for trial are the same.

For offences which are determined summarily, more persons have been proceeded against.

No superannuation fund has been established, and the police force is insufficient in number to provide for the proper supervision and protection of the borough, the area of which is very extensive.

Borough of
Devonport.

BOROUGH of DEVONPORT.

Force - - - - - 46 persons.

Area in acres - - - -	2,380	Acres to each constable - - -	51
Population in 1861 (including 5,322 persons on ships of war)	50,440	Population to ditto, as per census 1861,	1,096

RANKS.	Head Constable or Chief Superintendent.	Yearly Pay in £. and Shillings.									Weekly Pay in Shillings and Pence.									
		Superintendents.					Inspectors. Total No. - 3.				Serjeants. Total No. - 5.				Constables. Total No. - 37.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	3	-	-	-	5	-	-	-	21	16				
Rates of Pay of each, ditto -	£. 120	-	-	-	-	-	£. s. 68 18	-	-	-	s. d. 23 6	-	-	-	s. d. 19 7	s. d. 18 5				

In this borough no change has taken place during the year, either in the number or pay of the police.

The indictable offences which have been reported are considerably less in number than in the previous year, but more persons have been committed for trial, and also more persons proceeded against for the class of offences which are determined summarily.

Two of the night beats are longer than is desirable, but on the whole the duties are fairly provided for, and I consider the force to be efficient.

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District.

CITY of EXETER.

City of Exeter.

Force - - - - - - 37 persons.

Area in acres - - - - -	1,800	Acres to each constable - - - -	48
Population in 1861 - - -	33,738	Population to ditto, as per census 1861,	911

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 4.				Serjeants. Total No. - 4.				Constables. Total No. - 28.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	-	4	–	–	–	4	–	–	–	9	5	14			
Rates of Pay of each, ditto -	£. 150	–	–	–	–	–	£. s. 62 8	–	–	–	s. 21	–	–	–	s. 19	s. 18	s. 17			

The police force of this city has undergone no change during the year either in numbers or pay.

The indictable offences which have been reported are rather less in number than in the previous year, as are also the apprehensions and committals for trial; and fewer persons have also been proceeded against for offences which are determined summarily.

The duties appear to be properly provided for, and I consider the force to be in an efficient state.

BOROUGH of PLYMOUTH.

Borough of Plymouth.

Force - - - - - - 75 persons.

Area in acres - - - - -	600	Acres to each constable - - - - -	8
Population in 1861 - - -	62,599	Population to ditto, as per census 1861, -	834

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - - 5				Serjeants. Total No. - 8.				Constables. Total No. - 61.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Clas
Number of each Rank and Class	1	–	–	–	–	–	1	2	2	–	7	1	–	–	1	20	20	20		
Rates of Pay of each, ditto -	£. 170	–	–	–	–	–	£. 110	£. s. 79 6	£. s. 68 18	–	s. d. 23 6	s. 22	–	–	s. 21	s. 19	s. d. 17 6	s. d. 16 6		

An augmentation of two constables was made to this force in the month of January last, but in other respects the force has undergone no change during the year.

I believe that it is in contemplation to raise the pay of the head constable, and also to increase the allowances for clothing.

The indictable offences which have been reported are rather more in number than in the previous year, but fewer persons have been apprehended and committed for trial; for offences also, which are determined summarily, fewer persons have been proceeded against.

As respects vagrants, the number who have been sheltered by the police and passed to the union, are stated to have amounted to 594 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

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Borough of Southmolton.

Borough of Southmolton.

Force - - - - - - 2 persons.

Area in acres - - - - 6,264 | Acres to each constable - - - 3,132
Population in 1861 - - - 3,830 | Population to ditto, as per census 1861, 1,915

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1					
Rates of Pay of each, ditto -	£. 78	-	-	-	-	-	-	-	-	-	-	-	-	-	s. d. 16 6					

The police force of this borough has undergone no change during the year.

The indictable offences which have been reported are less in number than in the previous year, as also are the apprehensions and committals for trial for such offences, and fewer persons have also been proceeded against for offences which are determined summarily.

The area of this borough is very extensive, and the police force is too small in number to afford proper protection over so large a district.

Borough of Tiverton.

Borough of Tiverton.

Force - - - - - - 7 persons.

Area in acres - - - - 17,650 | Acres to each constable - - - 2,521
Population in 1861 - - - 10,447 | Population to ditto, as per census 1861, 1,492

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 5.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	4	1				
Rates of Pay of each, ditto -	£. 78	-	-	-	-	-	-	-	-	-	s. 21	-	-	-	s. 19	s. 15				

In this borough the police force has undergone no change during the year either in numbers or pay.

The station and cells are maintained in a satisfactory state.

The indictable offences which have been reported are more in number than in the previous year, and more persons have been apprehended and committed for trial; for offences which are determined summarily, about the same number of persons have been proceeded against as in the previous year.

The area of this borough is very extensive, and the population also considerable, and an increase of several constables is necessary to place the police force in an efficient state.

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BOROUGH of TORRINGTON.

Force - - - - 2 persons.

Area in acres - - - - 3,456 | Acres to each constable - - - 1,728
Population in 1861 - - - 3,298 | Population to ditto, as per census 1861, 1,649

Borough of Torrington.

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1					
Rates of Pay of each, ditto	£. 52	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 15					

No alteration had taken place up to the date of my last inspection in the number or pay of this force, and since then no return has been furnished.

The proposal which the corporation had under consideration last year for building a new police station, with suitable cells, has not been carried into effect.

The duties are not effectively provided for, and the area of the borough is too extensive to be properly patrolled and watched by so small a force.

BOROUGH of TOTNES.

Force - - - - - 3 persons.

Area in acres - - - - 1,254 | Acres to each constable - - - 418
Population in 1861 - - - 4,001 | Population to ditto, as per census 1861, 1,333

Borough of Totnes.

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 2.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2					
Rates of Pay of each, ditto	£. 66	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 18					

No alteration had taken place up to the date of my last inspection in the number of this force, and since then no return has been furnished.

The superintendent is a man far advanced in years, and not able to undertake active police duty, and the force is otherwise insufficient in number for the population and extent of the borough.

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DORSETSHIRE.

County of Dorset, including the Boroughs of Bridport, Lyme, and Shaftesbury.

Force - - - - - - 133 persons.

Area in acres - - - - 624,758 | Acres to each constable - - - 4,697
Population in 1861 - - - 159,303 | Population to ditto, as per census 1861, 1,197

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - 10.					Inspectors.				Serjeants. Total No. - 11.				Constables. Total No. - 111.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	1	4	4	–	–	–	–	–	11	–	–	–	36	36	39			
Rates of Pay of each, ditto	£. 300	£. 150	£. 130	£. 95	£. 85	–	–	–	–	–	s. 23	–	–	–	s. 20	s. 18	s. 17			

Chief Constable.—Horse and travelling allowance, 150 *l.*
Superintendents.—Horses, forage, carts, stabling, &c., provided.

No alteration has taken place during the year, either in the pay or number of the police of this county; and no arrangement is in operation for granting increase of pay for length of service, except to the superintendents, who after seven years' service in such rank will be allowed an additional sum of 5 *l.* yearly.

To those officers and constables who are appointed to act as inspectors of low lodgings, and as assistant relieving officers and assistant Excise officers, no additional pay is granted, but a small allowance is granted to the inspectors of weights and measures, to cover expenses.

The indictable offences which have been reported are less in number than in the previous year, but rather more persons have been committed for trial, and also more persons proceeded against for offences which are determined summarily. As respects vagrants, the number who have been passed by the police to lodging-houses and the unions is reported to have amounted to 1,658 persons.

The station-houses are all in a satisfactory state, with the exception of the one in Lyme, which belongs to the borough authorities, and which requires better cell accommodation.

The duties are well provided for, and I consider the force to be in an efficient state.

BOROUGH OF BLANDFORD.

Borough of Blandford.

Force - - - - - 2 persons.

Area in acres - - - - 27 | Acres to each constable - - - 13½
Population in 1861 - - - 1,521 | Population to ditto, as per census 1861, 760

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 2.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2					
Rates of Pay of each, ditto	–	–	–	–	–	–	–	–	–	–	–	–	–	–	s. 16					

No alteration has taken place during the year in the number or pay of this force.

The corporation have, however, erected a new police station, with a couple of well-constructed

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well-constructed cells, and accommodation also for one married resident constable.

No indictable offences are reported to have taken place during the year, but 39 persons were proceeded against for offences which are determined summarily.

One of the tradespeople acts as superintendent, for which he is allowed 5*l.* per annum. The constables take duty alternately, for eight hours at a time

Borough of Dorchester.

Borough of Dorchester.

Force - - - - - - 7 persons.

Area in acres - - - - -	571	Acres to each constable - - -	81
Population in 1861 - - -	6,823	Population to ditto, as per census 1861,	974

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 5.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	5					
Rates of Pay of each ditto	£. 60	-	-	-	-	-	-	-	-	-	*s. d.* 21 6	-	-	-	*s. d.* 18 6					

The police force of this borough has undergone no change during the year either in numbers or pay.

In indictable offences there has been an increase, and more persons have been apprehended and committed for trial than the previous year; for offences, however, which are determined summarily fewer persons have been proceeded against.

The number of vagrants who have been provided with shelter by the police during the year are stated to have amounted to only nine persons.

The duties are generally well provided for, and I consider the force to be in an efficient state.

Borough of Poole.

Borough of Poole.

Force - - - - - - 14 persons.

Area in acres - - - - -	4,749	Acres to each constable - - -	339
Population in 1861 - - -	9,759	Population to ditto, as per census 1861,	697

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 12.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	4	4	4			
Rates of Pay of each ditto	*£. s. d.* 105 1 8	-	-	-	-	-	-	-	-	-	*s.* 22	-	-	-	*s.* 20	*s.* 18	*s.* 17			

In this borough the wages of the head officer and serjeant of the police force have been increased, but in other respects the force has undergone no alteration.

In indictable offences there has been an increase during the year, and rather more persons have been committed for trial; for offences, however, which are deter-

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mined summarily, the number of persons who have been proceeded against is less than in the previous year.

The station and cells are maintained in excellent order and the duties satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH of WEYMOUTH.

Borough of Weymouth.

Force - - - - - - 12 persons.

Area in acres - - - -	1,600	Acres to each constable - - -	133
Population in 1861 - - -	11,383	Population to ditto, as per census 1861,	948

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 2.				Constables. Total No. - 9.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	2	-	-	-	4	5				
Rates of Pay of each ditto -	£. 120	-	-	-	-	-	-	-	-	-	s. 23	-	-	-	s. 20	s. 19				

In this borough an increase of pay has been granted to the head constable, and an additional serjeant has been created, but the total number of the force has undergone no change.

The indictable offences which have been reported are less by one offence than in the previous year, and three fewer persons have been committed for trial; but for offences which are determined summarily, considerably fewer persons have been proceeded against.

The number of vagrants who were sheltered by the police during the year and passed to the union amounted to 225 persons.

The cells are not of the best construction, but are maintained in a cleanly state.

The duties are generally well provided for, and I consider the force to be in an efficient state.

GLOUCESTERSHIRE.

County of Gloucester, including the City of Gloucester and Borough of Tewkesbury.

Force - - - - - 288 persons.

Area in acres - - - -	787,414	Acres to each constable - - -	2,734
Population in 1861 - - -	351,602	Population to ditto, as per census 1861,	1,220

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - 11,					Inspectors.				Serjeants. Total No. - 44.				Constables. Total No. - 232.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	1	4	5	-	-	-	-	-	44	-	-	-	147	85				
Rates of Pay of each ditto -	£. 450	£. 140	£. 130	£. 120	£. 100	-	-	-	-	-	s. d. 21 6	-	-	-	s. 19	s. 16				

Chief Constable.—Horse and Travelling allowance, 100 *l.*

Superintendents.—Provide their own horses, and are allowed stabling, and 40 *l.* each for keep, &c.

In this county the police force has undergone no change during the year either in numbers or pay, but I have to report the appointment of a new chief constable,

Captain

No. 3.
South of England and South Wales District.

Captain Christian, of the Royal Navy, in the place of Mr. Lefroy, who has retired, after having served the county in command of the constabulary with much credit to himself for a period of 25 years.

No progressive scale of pay is in operation, but the officers who are appointed to act as inspectors of weights and measures and as assistant relieving officers receive a small remuneration in addition to their ordinary pay for the extra duties which such appointments impose upon them.

The indictable offences which have been reported are less in number than in the previous year, and fewer persons have been committed for trial, and fewer persons also proceeded against for offences which are determined summarily.

As respects vagrants, the number who have been passed by the police to lodging-houses and the unions is stated to have amounted to 12,639 persons.

Two new station-houses with good cells, one at Dursley and the other at Wootton-under-Edge, have been erected during the year; and two other stations have been taken on rent, one at Whitecroft and the other at Kingswood Hill. Better station-houses, with suitable places for the detention of prisoners, are required at Stowe and Newnham, and further cell accommodation is also required at Whitminster and Mitcheldean. I understand, however, that these matters have been brought before the notice of the magistrates by the chief constable.

The clothing which has been supplied to the police this year is not of good quality, nor indeed at all well made.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

City of Bristol.

Force - - - - - 303 persons.

City of Bristol.

Area in acres - - - -	4,683	Acres to each constable - - -	15
Population in 1861 - - -	154,093	Population to ditto, as per census 1861 -	508

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 5.				Serjeants. Total No. - 38.				Constables. Total No. - 259.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	5	-	-	-	4	4	4	26	183	74	2			
Rates of Pay of each ditto	£. 380	-	-	-	-	-	£. 117	-	-	-	s. 30	s. 26	s. 25	s. 24	s. 20	s. 18	s. 16			

Head Constable.—Allowance for a horse, 50*l.*

In this city the pay of the head constable, serjeants and constables has undergone revision and augmentation, and a re-arrangement of the different classes of the serjeants and constables has also been carried into effect.

No general progressive scale of pay for length of service has been established, but under the new system of pay, which has been adopted, all constables on entering the force are to receive 16 *s.* per week for the first month's service, 18 *s.* per week for the next 23 months, and after two years' service, 20 *s.* per week.

The stations are generally in good order, and maintained in a cleanly and creditable state, but the station in St. Philips's district is inconveniently small, and too limited in accommodation for the resident police, and the cells are also badly constructed and deficient of ventilation, and also too small in area.

The indictable offences which have been reported are more in number than in the previous year, but rather fewer persons have been apprehended and committed for trial; for offences, however, which are determined summarily, more persons have been proceeded against.

The duties appear to be effectively provided for, and I consider the force to be in an efficient state.

No. 3.
South of England
and South Wales
District.

HAMPSHIRE.

County of Hants, including the Boroughs of Andover and Lymington.

Force - - - - - - 259 persons.

Area in acres - - - -	1,053,777	Acres to each constable - -	4,068
Population in 1861 - - -	310,576	Population to ditto, as per census 1861 -	1,199

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents Total No. - 14.					Inspectors. Total No. - 1.				Serjeants. Total No. - 23.				Constables. Total No. - 220.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	5	5	4	-	-	1	-	-	-	23	-	-	-	73	73	74			
Rates of Pay of each ditto -	£. 400	£. 136	£. 130	£. 120	-	-	£. s. 75 4	-	-	-	s. 25	-	-	-	s. 21	s. 19	s. 17			

Chief Constable.—Horse and travelling allowance, 100 *l.*
Superintendents.—Horses, forage, carts, stabling, &c. provided.

In this county the number of the police force, and the rates of pay, have undergone no alteration during the year; a progressive scale of pay, however, is in operation for the superintendents and serjeants for stated periods of service.

Superintendents, after seven years' service in such rank, receive an addition of 5 *l.* yearly, and after 15 years' service an addition of 10 *l.*

Serjeants, after two years' service in such rank, if promoted to the rank of inspector or superintendent, are allowed to count one of such years as if held in the rank to which they are promoted.

The officers and constables in this force, in addition to their ordinary police duty, undertake the duties attached to a variety of important appointments, and without any extra pay or allowances.

One new police station has been completed during the year at Totton; the other stations are all in a satisfactory state, but a more commodious station is required at Shirley, which has now become a very populous district.

The indictable offences which have been reported are more in number than in the previous year, and more persons have been apprehended and committed for trial; for offences also, which are determined summarily, more persons have been proceeded against.

The number of vagrants who were passed by the police to the unions during the year are stated to have amounted to 7,892 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH of BASINGSTOKE.

Borough of Basingstoke.

Force - - - - - - 5 persons.

Area in acres - - - -	4,036	Acres to each constable - - -	807
Population in 1861 - - -	4,654	Population to ditto, as per census 1861,	930

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 3.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1	2				
Rates of Pay of each ditto -	£. 65	-	-	-	-	-	-	-	-	-	s. 22	-	-	-	s. 18	s. 17				

No. 3.
South of England and South Wales District.

No alteration has taken place during the year in the number or pay of this force.

A plan has been under the consideration of the borough authorities for an alteration of the police-station, so as to provide better cells, which are much required, and I am of opinion that the proposed alterations are satisfactorily planned.

The number of indictable offences which have been reported are the same as in the previous year, but fewer persons have been committed for trial. For offences, however, which are determined summarily, more persons have been proceeded against.

The area of this borough is extensive, and the force is too small in number to afford efficient protection in the outskirts of the town; the town duties are, however, fairly provided for.

BOROUGH of NEWPORT (ISLE of WIGHT).

Borough of Newport (Isle of Wight).

Force - - - - 5 persons.

Area in acres - - - -	156	Acres to each constable - - -	31
Population in 1861 - - -	7,934	Population to ditto, as per census 1861,	1,586

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 4.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4					
Rates of Pay of each ditto -	£. 75	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 18					

No alteration had taken place up to the date of my last inspection in the number or pay of this force, and since then no return has been furnished.

The duties are not effectively provided for, and the force is insufficient in number for the population and extent of the borough.

BOROUGH of PORTSMOUTH.

Borough of Portsmouth.

Force - - - - - 95 persons.

Area in acres - - - -	4,515	Acres to each constable - - - -	47
Population in 1861 - - -	94,799	Population to ditto, as per census 1861 -	787

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 6.				Serjeants. Total No. - 13.				Constables. Total No. - 75.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	6	-	-	-	13	-	-	-	22	24	29			
Rates of Pay of each ditto -	£. 190	-	-	-	-	-	£. 85	-	-	-	s. 26	-	-	-	s. d. 23 6	s. 21	s. 19			

In this borough the numbers in the different classes of the constables have been re-arranged so as to afford to the lower class constables more frequent opportunities of advancement in pay, but in other respects the force has undergone no alteration.

No. 3.
South of England and South Wales District.

The cells in the head-quarter station are dark, and very badly ventilated, and the station is also deficient in accommodation for the general requirements of the police service.

The indictable offences which have been reported are considerably less in number than in the previous year, as are also the committals for trial; and fewer persons have been proceeded against for offences which are determined summarily.

The number of vagrants who were passed by the police to the union amounted to 2,722 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH of ROMSEY.

Borough of Romsey

Force - - - - - 2 persons.

Area in acres - - - -	248	Acres to each constable - - -	124
Population in 1861 - - -	2,116	Population to ditto, as per census 1861,	1,058

RANKS.	Yearly Pay in £.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendent.					Inspectors.				Serjeants.				Constables. Total No. - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1					
Rates of Pay of each ditto -	£. s. 49 8	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 17					

The police force of this borough has undergone no alteration during the year; since the 29th of last September, however, the borough has united with the county for police purposes, and consequently the protection of the borough will from henceforth be under the direction of the chief constable of the county.

Four indictable offences are reported to have been committed during the year, for which four persons were committed for trial, and for offences which are determined summarily 29 persons were proceeded against.

BOROUGH of SOUTHAMPTON.

Borough of Southampton.

Force - - - - - 57 persons.

Area in acres - - - -	2,630	Acres to each constable - - -	46
Population in 1861 - - -	46,960	Population to ditto, as per census 1861,	823

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 1.				Serjeants. Total No. - 10.				Constables. Total No. - 45.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	1	-	-	-	10	-	-	-	15	12	18			
Rates of Pay of each ditto -	£. 200	-	-	-	-	-	£. s. 79 6	-	-	-	s. d. 26 6	-	-	-	s. d. 23 6	s. d. 21 6	s. d. 19 6			

No alteration has taken place during the year in the number or pay of the police of this borough.

The stations and cells are maintained in a cleanly and satisfactory state.

The indictable offences which have been reported are rather more in number than in the previous year, and more persons have been apprehended and committed

mitted for trial, and also more persons proceeded against for offences which are determined summarily.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

CITY of WINCHESTER.

Force - - - - 15 persons.

City of Winchester.

Area in acres - - - -	1,043	Acres to each constable - -	69
Population in 1861 - - -	14,776	Population to ditto, as per census 1861,	985

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 2.				Constables. Total No. - 12.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	2	–	–	–	12					
Rates of Pay of each ditto	£. 104	–	–	–	–	–	–	–	–	–	s. 22	–	–	–	s. 20					

No alteration has taken place during the year in the number or pay of the police of this city.

The station and cells are maintained in a satisfactory state.

The indictable offences which have been reported are more in number than in the previous year, and more persons have been apprehended and committed for trial; for offences also which are determined summarily, more persons have been proceeded against.

The duties are generally well provided for, and I consider the force to be in an efficient state.

HEREFORDSHIRE.

Force - - - - 62 persons.

County of Hereford.

Area in acres - - - -	510,686	Acres to each constable - - -	8,236
Population in 1861 - - -	102,359	Population to ditto, as per census 1861,	1,650

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - 9.					Inspectors.				Serjeants. Total No. - 12.				Constables. Total No. - 40.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	3	3	3	–	–	–	–	–	–	6	6	–	–	14	26				
Rates of Pay of each ditto	£. 255	£. 98	£. 90	£. 82	–	–	–	–	–	–	s. 23	s. 21	–	–	s. 19	s. 17				

Chief Constable.—Horse and travelling allowance, 90 *l.*

Superintendents provide their own horses, but are supplied with carts, and harness, and stabling, and allowed respectively for forage, &c., one 48 *l.*, one 44 *l.*, and seven 40 *l.*, annually.

In this county the number of the police force and the rates of pay granted to the several ranks of officers and constables have undergone no change during the year.

No progressive scale of pay is in operation; but some of the officers who act as inspectors of weights and measures and low lodging-houses, and as assistant

relieving

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relieving officers, receive remuneration, in addition to their ordinary pay, for the duties which such appointments impose upon them.

Several of the station-houses in this county require alteration and improvement, especially the stations at Harewood's End, Abbey Dore, Weobley, Leominster, and Bromyard, and in regard to which the chief constable is in a position to inform the magistrates; and at Ross it would be extremely desirable that some land which is situated immediately in front of, and quite close to, the station-house, and on which buildings might be erected so as to be a great nuisance, should be purchased.

The indictable offences which have been reported are less in number than in the previous year, but rather more persons have been committed for trial, and also more persons proceeded against for those offences which are determined summarily.

The number of vagrants who have been passed by the police to the unions during the year are stated to have amounted to 4,501 persons.

The duties are generally fairly provided for, and I consider the force to be in an efficient state.

City of Hereford.

City of Hereford.

Force - - - - - 30 persons.

Area in acres - - - -	4,670	Acres to each constable - - -	155
Population in 1861 - - -	15,585	Population to ditto, as per census 1861,	519

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 1.				Serjeants. Total No. - 3.				Constables. Total No. - 25.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	1	–	–	–	3	–	–	–	3	3	11	6	2	
Rates of Pay of each ditto -	£. 115	–	–	–	–	–	£. s. 59 16	–	–	–	s. 21	–	–	–	s. 20	s. 19	s. 18	s. 17	s. 10	

No alteration has been made during the year in the number of the police of this city.

As respects the constables, a progressive scale of pay has been established.

Constables on entry, and whilst in the 5th or probationary class, are allowed only 10 *s.* per week, but on approval, 17*s.* per week; after one year's service, 18*s.* per week, and after three years' service, 19*s.* per week. Constables may, however, be advanced to 20*s.* per week on the special recommendation of the head constable.

The indictable offences which have been reported are more in number than in the previous year, as also are the apprehensions and committals for trial; and more persons have also been proceeded against for offences which are determined summarily.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

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South of England
and South Wales
District.

Borough of Leominster.

Force - - - - 8 persons.

Borough of Leominster.

Area in acres - - - -	7,284	Acres to each constable - - -	910
Population in 1861 - - -	5,658	Population to ditto, as per census 1861,	707

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 6.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	1	–	–	–	4	2				
Rates of Pay of each ditto	£. 109	–	–	–	–	–	–	–	–	–	s. d. 21 8	–	–	–	s. d. 17 8	s. d. 16 8				

In this borough the police force has undergone no change during the year.

The cells are badly situated and inconvenient of access, but they are maintained in a cleanly state

As persons are, however, frequently detained some time in the cells, under remand, it is desirable that the back yard or garden should be made secure, which might easily be effected by raising the side wall.

The indictable offences which have been reported are rather more in number than in the previous year, but fewer persons have been committed for trial, and fewer persons also proceeded against for offences which are determined summarily.

The duties are, generally, fairly provided for, and I consider the force to be in an efficient state.

KENT.

Force - - - - 262 persons.

County of Kent,

Area in acres - - - -	945,566	Acres to each constable - - -	4,180
Population in 1861 - - -	362,771	Population to ditto, as per census 1861,	1,384

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										
	Chief Constable.	Superintendents. Total No. - 13.					Inspectors. Total No. - 2.				Serjeants. Total No., 24.				Constables. Total No. - 222.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	5	4	4	–	–	2	–	–	–	12	12	–	–	48	124	50			
Rates of Pay of each ditto	£. 400	£. s. d. 139 18 4	£. s. d. 130 15 10	£. s. d. 118 12 6	–	–	£. s. 109 10	–	–	–	s. 28	s. d. 24 6	–	–	s. d. 22 9	s. 21	s. d. 18 8			

Chief Constable.—Horse and travelling allowance, 200 *l.*
Superintendents.—Horses, carts, forage, stabling, &c. provided.

No alteration has taken place in the number of the police force of this county, but the classes of the serjeants and constables have been altered, and a considerable increase made to the pay of the different grades of officers and constables.

No progressive scale of pay, however, for length of service has been adopted, and no extra remuneration is granted to any members of the force who are appointed to act as inspectors of nuisances, weights and measures, and low lodgings, or as assistant relieving officers, &c.

Four new police stations are in the course of construction, viz., at Dartford, Sittingbourne,

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Sittingbourne, Sheerness, and Northfleet, and a new head quarter divisional station has also been lately completed and placed in charge of the police at Ashford.

The other stations are also in good order, and at the head quarters in Maidstone a large building has been erected for the accommodation of those officers and constables who may be required to attend the assizes, or who may be ordered to head quarters for drill or other duties.

The indictable offences which have been reported are nearly the same in number as in the previous year, but rather more persons have been committed for trial, and also more persons proceeded against for the class of offences which are determined summarily.

The number of vagrants who have been passed by the police to the unions are stated to have amounted to 3,349 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

CITY OF CANTERBURY.

City of Canterbury.

Force - - - - - 21 persons.

Area in acres - - - -	3,568	Acres to each constable - - -	169
Population in 1861 - - -	21,324	Population to ditto, as per census 1861,	1,015

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 2.				Serjeants. Total No. - 2.				Constables. Total No. - 16.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	2	-	-	-	2	-	-	-	16					
Rates of Pay of each ditto -	£. 100	-	-	-	-	-	£. s. 68 18	-	-	-	s. d. 24 6	-	-	-	s. d. 19 6					

No alteration has taken place during the year in the police force of this city.

The cells are rather dark, but in other respects are maintained in a satisfactory state.

The indictable offences which have been reported are considerably less in number than in the previous year, and fewer persons have been committed for trial. For offences, however, which are determined summarily more persons have been proceeded against.

As respects vagrants, the number who have been provided with shelter by the police, and passed to the union, is stated to have amounted to 207 persons

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH OF DEAL.

Borough of Deal.

Force - - - - - 8 persons.

Area in acres - - - -	1,159	Acres to each constable - - -	144
Population in 1861 - - -	7,531	Population to ditto, as per census 1861,	941

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 6.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	3	3				
Rates of Pay of each ditto -	£. 65	-	-	-	-	-	-	-	-	-	s. 20	-	-	-	s. d. 17 6	s. 15				

No. 3.
South of England and South Wales District.

The police force of this borough has undergone no alteration during the year, either in numbers or pay.

The station and cells are maintained in a cleanly and satisfactory condition.

More indictable offences are reported to have taken place than in the previous year, and more persons have been committed for trial.

For offences, also, which are determined summarily, more persons have been proceeded against.

The number of vagrants who were provided with shelter by the police are stated to have amounted to 48 persons.

The duties are generally well provided for, and I consider the force to be in an efficient state.

BOROUGH of DOVER.

Borough of Dover.

Force - - - - - 25 persons.

Area in acres - - - -	3,500	Acres to each constable - - -	140
Population in 1861 - - -	25,325	Population to ditto, as per census 1861,	1,013

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 4.				Constables. Total No. - - 20.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	4	-	-	-	8	7	5			
Rates of Pay of each ditto -	£. 140	-	-	-	-	-	-	-	-	-	s. 25	-	-	-	s. 21	s. 20	s. 19			

In this borough no alteration has taken place during the year either in the number or pay of the police; in consequence, however, of the increase of buildings, and consequent increase of the beats, I am of opinion that some augmentation of the police force is now desirable.

The indictable offences which have been reported are rather fewer in number than in the previous year; but more persons have been apprehended and committed for trial for such offences, and also more persons proceeded against for offences which are determined summarily. As respects vagrants, the number who have been passed by the police to the union are stated to have amounted to 1,080 persons.

The duties are, generally, fairly provided for, and the force is working efficiently; but I think it is desirable that the extended beats to which I have referred should be reduced in the time for working them.

BOROUGH of FAVERSHAM.

Borough of Faversham.

Force - - - - - 7 persons.

Area in acres - - - -	2,036	Acres to each constable - - -	290
Population in 1861 - - -	5,858	Population to ditto, as per census 1861,	836

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 5.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	5					
Rates of Pay of each ditto -	£. 100	-	-	-	-	-	-	-	-	-	s. d. 24 6	-	-	-	s. d. 19 6					

No. 3.
South of England
and South Wales
District.

The number of the police force of this borough has undergone no change during the year; but the organization of the force has been improved by making one of the constables a serjeant, by which the head officer will be assisted in overlooking the night duty.

One indictable offence only is reported to have been committed during the year, and one person only to have been committed for trial. For offences which are determined summarily, 94 persons were proceeded against.

The duties are generally well provided for, and I consider the force to be efficient.

BOROUGH of FOLKESTONE.

Borough of
Folkestone.

Force - - - - - 11 persons.

Area in acres - - - -	2,697	Acres to each constable - - -	245
Population in 1861 - - -	8,507	Population to ditto, as per census 1861,	773

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 9.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	4	5				
Rates of Pay of each ditto -	£. s. 121 10	-	-	-	-	-	-	-	-	-	s. d. 25 4	-	-	-	s. d. 20 10	s. d. 19 10				

No alteration has taken place during the year in the number or pay of the police force of this borough. I am, however, of opinion that in consequence of the increase of buildings and population, some addition to the force is desirable.

The indictable offences which have been reported are considerably more in number than in the previous year, and more persons have been apprehended and committed for trial. For offences also which are determined summarily, more persons have been proceeded against.

As respects vagrants, 86 are reported to have been provided with shelter by the police during the year.

The duties are, generally, fairly provided for, and the force is working efficiently; but I consider it is desirable that the time of working the beats, to which I have referred, should be reduced by making some addition to the force.

BOROUGH of GRAVESEND.

Borough of
Gravesend.

Force - - - - - 22 persons.

Area in acres - - - -	1,271	Acres to each constable - - -	57
Population in 1861 - - -	18,782	Population to ditto, as per census 1861,	853

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 4.				Constables. Total No. - 17.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class,	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	4	-	-	-	7	7	3			
Rates of Pay of each ditto -	£. s. d. 121 19 4	-	-	-	-	-	-	-	-	-	s. d. 28 11	-	-	-	s. d. 24 9	s. d. 22 9	s. d. 21 9			

The police force of this borough has undergone no change during the year.

The indictable offences which have been reported, are less in number than in the previous year, but two more persons have been committed for trial, and more persons

No. 3.
South of England and South Wales District.

persons have also been proceeded against for offences which are determined summarily.

The number of vagrants who have been passed by the police to the union during the year, are stated to have amounted to 5,303 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH of HYTHE.

Borough of Hythe.

Force - - - - - 2 persons.

Area in acres - - - -	882	Acres to each constable - -	441
Population in 1861 - - -	3,001	Population to ditto, as per census 1861,	1,500

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1					
Rates of Pay of each ditto -	£. 65	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 22					

No alteration has taken place up to the date of my last inspection in the number of this force.

In order to provide for the proper watching of this borough by night, the services of another constable are required.

Only two indictable offences are reported to have been committed, for which two persons were apprehended and committed for trial; for offences which are determined summarily 34 persons were proceeded against.

BOROUGH of MAIDSTONE.

Borough of Maidstone.

Force - - - - - 23 persons.

Area in acres - - - -	4,232	Acres to each constable - -	184
Population in 1861 - - -	23,016	Population to ditto, as per census 1861;	1,000

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 2.				Serjeants. Total No. - 2.				Constables. Total No. - 18.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	2	-	-	-	1	1	-	-	9	1	4	4		
Rates of Pay of each ditto -	£. s. d. 155 11 4	-	-	-	-	-	£. s. 81 18	-	-	-	s. d. 28 5	s. d. 26 5	-	-	s. d. 22 4	s. d 21 3	s. d. 20 3	s. d. 19 3		

In this borough the classes of the constables have been altered, but in other respects the force has undergone no alteration during the year.

More indictable offences are reported to have taken place than in the previous year, and more persons have been committed for trial; for offences also which are determined summarily, more persons are reported to have been proceeded against.

The number of vagrants who were provided with shelter by the police are stated to have amounted to 291 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH OF MARGATE.

Borough of Margate.

Force - - - - - 10 persons.

Area in acres - - - -	240	Acres to each constable - - - -	24
Population in 1861 - - -	8,874	Population to ditto, as per census 1861 -	887

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 2.				Constables. Total No. - 7.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	2	-	-	-	7					
Rates of Pay of each ditto -	£. 110	-	-	-	-	-	-	-	-	-	s. 25	-	-	-	s. 20					

The police force of this borough has undergone no change during the year.

In addition to the number of police, as above stated, the corporation employ two men to assist in the duties during the bathing season. I am, however, of opinion that for the ordinary duties another constable is now required, as two of the night beats are more extensive than is desirable.

One more indictable offence is reported to have been committed than in the previous year, and four more persons to have been committed for trial, and also four more persons to have been proceeded against for offences which are determined summarily.

The duties are generally well provided for, and the force is working efficiently; I think, however, that it is desirable that another constable should now be permanently added to the force.

TOWN OF RAMSGATE.

Town of Ramsgate.

Force - - - - - 13 persons.

Area in acres - - - -	260	Acres to each constable - - -	20
Population in 1861 - - -	11,865	Population to ditto, as per census 1861 -	912

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 2.				Constables. Total No. - 10.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	2	-	-	-	4	6				
Rates of Pay of each ditto -	£. 115	-	-	-	-	-	-	-	-	-	s. 24	-	-	-	s. 21	s. 19				

No alteration has taken place during the year in the police force of this town. I am, however, of opinion that an augmentation of one constable is now necessary in order to reduce two of the night beats, which are of a greater extent than is desirable.

More indictable offences are reported to have taken place than in the previous year, and more persons have been apprehended for such offences, but fewer persons have been committed for trial.

For offences which are determined summarily more persons have been proceeded against.

The duties are, generally, fairly provided for, and the force is working efficiently; but I consider that it is desirable that the beats to which I have referred should be reduced in extent by making the addition to the force which I have suggested.

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South of England
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District.

City of Rochester.

City of Rochester.

Force - - - - - - 32 persons.

Area in acres - - - - -	2,715	Acres to each constable - -	84
Population in 1861 - - -	16,862	Population to ditto, as per census 1861,	527

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 6.				Constables. Total No. - 25.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	4	2	-	-	16	2	3	4		
Rates of Pay of each ditto -	£. 114	-	-	-	-	-	-	-	-	-	s. d. 27 7	s. d. 25 7	-	-	s. d. 21 7	s. d. 20 7	s. d. 19 7	s. 19		

An augmentation of one constable has been made to the police force of this city during the year, and the pay of the force generally has also been increased as stated above, but no progressive scale of pay for length of service has been established.

Of the police force as above enumerated, four of the constables are appointed to take duty on the river, and a boat is provided for this purpose.

The indictable offences which have been reported are more in number than in the previous year, and more persons have been apprehended and committed for trial. For offences also which are determined summarily more persons have been proceeded against.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

Borough of Sandwich.

Force - - - - - - 1 person.

Borough of Sandwich.

Area in acres - - - - -	703	Acres to each constable - -	703
Population in 1861 - - -	2,944	Population to ditto, as per census 1861,	2,944

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1																			
Rates of Pay of each ditto -	£. 28																			

There is no properly organized police force in this borough, and the constable is partly paid by fees and partly by fixed wages.

No superannuation fund has been established.

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South of England and South Wales District.

Borough of Tenterden.

BOROUGH of TENTERDEN.

Force - - - - - - 4 persons.

Area in acres - - - -	8,394	Acres to each constable - -	2,098
Population in 1861 - - -	3,762	Population to ditto, as per census 1861,	940

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 3.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	–	–	–	–	3					
Rates of Pay of each ditto -	£. 30	–	–	–	–	–	–	–	–	–	–	–	–	–	s. 18					

No alteration had taken place up to the date of my last inspection in the number or pay of this force, and since then no return has been furnished.

One of the constables is upwards of 70 years of age, and it is desirable that he should be pensioned, as it is impossible for him to undertake active police duty.

The officer in charge is also a tradesman in the town, and consequently only a portion of his time can be devoted to police duty.

Only one indictable offence is reported to have been committed, for which one person was apprehended and committed for trial; for offences which are determined summarily seven persons were proceeded against.

TOWN of TUNBRIDGE WELLS.

Town of Tunbridge Wells.

Force - - - - - - 21 persons.

Area in acres - - - -	3,350	Acres to each constable - -	159
Population in 1861 - - -	13,807	Population to ditto, as per census 1861,	657

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 1.				Serjeants. Total No. - 2.				Constables. Total No. – 17.					
		1 st C	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	1	–	–	–	1	1	–	–	5	2	4	6		
Rates of Pay of each ditto -	£. s. 125 9	–	–	–	–	–	£. s. 79 9	–	–	–	s. d. 26 8	s. d. 24 8	–	–	s. d. 21 6	s. d. 20 6	s. d. 19 6	s. d. 18 6		

An augmentation of four constables has been made to this force during the year, and the pay of the officers has been increased. As respects the constables a progressive scale of pay for length of service has been established. Constables on joining receive 18 *s.* 6 *d.* per week; after two years' service, 19 *s.* 6 *d.* per week; after four years' service, 20 *s.* 6 *d.* per week; and after six years' service, 21 *s.* 6 *d.* per week.

The indictable offences which have been reported are less in number than in the previous year, and fewer persons have been apprehended, but more persons committed for trial. For offences which are determined summarily fewer persons have been proceeded against.

The number of vagrants who were sheltered by the police, and passed to the union, are stated to have amounted to 698 persons.

The duties are generally well provided for, and I consider the force to be in an efficient state.

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South of England and South Wales District.

MONMOUTHSHIRE.

County of Monmouth.

Force - - - - - - 98 persons.

Area in acres - - - -	364,087	Acres to each constable - - -	3,715
Population in 1861 - - -	145,711	Population to ditto, as per census 1861,	1,486

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - 4.					Inspectors. Total No. - 4.				Serjeants. Total No. - 14.				Constables. Total No. - 75					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	1	1	1	-	4	-	-	-	14	-	-	-	28	32	15			
Rates of Pay of each, ditto -	£. 350	£. 125	£. 120	£. 115	£. 110	-	£. 78	-	-	-	s. 25	-	-	-	s. 21	s. 20	s. 18			

Chief Constable.—Horse and travelling allowance, 100 *l.*
Superintendents—Provide their own horses, and are allowed 60 *l.* each for keep, &c.

No alteration has taken place during the year in the number of the police force of this county, but the pay of the superintendents has been augmented to the extent of 5 *l.* per head, in accordance with an arrangement which provides that each superintendent shall receive annually an increase of 5 *l.* from the pay of 100 *l.* per annum, which is the pay on which he enters the rank, until the pay amounts to 150 *l.* per annum.

In addition to the ordinary pay, remuneration is also granted to those officers who are appointed to act as inspectors of nuisances and as assistant relieving officers.

One new police-station is in the course of construction at Caerleon, and land has been obtained for building new station-houses at Tredegar and Chepstow, where they are much required.

The indictable offences which have been reported are considerably less in number than in the previous year, and much fewer persons have been apprehended and committed for trial; for offences, however, which are determined summarily, more persons have been proceeded against.

In respect to vagrants, the number who have been passed by the police to lodging-houses and the unions, is stated to have amounted to 4,963 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH of MONMOUTH.

Borough of Monmouth.

Force - - - - - - 6 persons.

Area in acres - - - -	5,407	Acres to each constable - - -	901
Population in 1861 - - -	5,783	Population to ditto, as per census 1861,	963

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 4.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	4					
Rates of Pay of each, ditto -	£. s. 82 14	-	-	-	-	-	-	-	-	-	s. d. 19 7	-	-	-	s. d. 18 7					

In this borough the police force has undergone no alteration during the year.

The indictable offences which have been reported are more in number than in

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in the previous year, and more persons have been apprehended, but the committals for trial are the same in number.

For offences which are determined summarily, there has been a considerable decrease in the number of persons who have been proceeded against.

As respects vagrants, the number who have been passed by the police to the union is stated to have been 1,937 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH OF NEWPORT.

Borough of Newport.

Force - - - - - 26 persons.

Area in acres - - - - -	996	Acres to each constable - - -	38
Population in 1861 - - -	23,249	Population to ditto, as per census 1861,	894

	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
RANKS.	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 1.				Serjeants. Total No. - 5.				Constables. Total No. - 19.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	1	–	–	–	1	4	–	–	12	1	6			
Rates of Pay of each, ditto -	£. 130	–	–	–	–	–	£. 90	–	–	–	s. d. 28 6	s. d. 26 6	–	–	s. d. 22 6	s. d. 20 6	s. d. 18 6			

In this borough the number of the police force has undergone no alteration during the year, but the pay of the inspector and serjeants have been augmented.

Constables on joining receive 18 *s.* 6 *d.* per week; after six months' service, 20 *s.* 6 *d.* per week; and after one year's complete service, 22 *s.* 6 *d.* per week.

The indictable offences which have been reported are less in number than in the previous year, but more persons have been committed for trial. For offences which are determined summarily, much fewer persons have been proceeded against.

As respects vagrants, the number who have been passed by the police to the union during the year is stated to have amounted to 4,326 persons.

Some of the night beats are become too extended, and I am of opinion that an augmentation of at least two constables is necessary; the duties on the whole, however, are generally well provided for, and with this exception I consider the force to be in an efficient state.

SOMERSETSHIRE.

County of Somerset, including the Boroughs of Glastonbury, Wells, and Yeovil.

Force - - - - - 286 persons.

Area in acres - - - -	1,051,498	Acres to each constable - -	3,676
Population in 1861 - - -	358,824	Population to ditto, as per census 1861,	1,254

	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
RANKS.	Chief Constable.	Superintendents. Total No. - 16.					Inspectors.				Serjeants. Total No. - 24.				Constables. Total No. - 245.					
		1st Clas.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4t Cla .	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	4	11	–	–	–	–	–	–	24	–	–	–	96	149				
Rates of Pay of each, ditto -	£. 500	£. 140	£. 120	£. 90	–	–	–	–	–	–	s. 23	–	–	–	s. 20	s. 18				

Chief Constable.—Horse and travelling allowance, 200 *l.*

Superintendents—Provide their own horses, and are allowed 46 *l.* each for keep, &c.

No. 3.
South of England and South Wales District.

An augmentation of one constable has been made to this force during the year for the district of Clevedon, but in other respects the force has undergone no change; since the 30th of September last, however, the quarter sessions have approved of a scheme for granting an increase of pay for length of service; but as the scheme has not as yet come into operation the particulars of the proposed increase are necessarily not given in the above table which states the rates of pay which are still granted to the police.

In addition to the ordinary pay, however, as now granted, allowances are made to those officers who are appointed to act as inspectors of nuisances and low lodging-houses, and as assistant relieving officers.

More indictable offences are reported to have taken place than in the previous year, and more persons have also been apprehended and committed for trial; for offences also which are determined summarily more persons have been proceeded against.

As respects vagrants, the number who have been passed by the police to lodging-houses is stated to have amounted to 635 persons, but only one officer undertakes this duty.

The station-houses are in good repair, and also maintained in a cleanly and satisfactory condition.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

City of Bath.

City of Bath.

Force - - - - 88 persons.

Area in acres - - - -	3,745	Acres to each constable - - -	42
Population in 1861 - - -	52,528	Population to ditto, as per census 1861,	596

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 6.				Serjeants. Total No. - 13.				Constables. Total No. - 68.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	3	1	2	-	1	12	-	-	1	12	10	19	26	
Rates of Pay of each, ditto	£. 250	-	-	-	-	-	£. 100	£. 85 s. 16	£. 78	-	s. 30	s. 24	-	-	s. 24	s. 21	s. 19	s. 18	s. 17	

The police force of this city has undergone no alteration during the year; I am, however, glad to be able to report that the corporation have erected a new police station with some well-constructed cells, which I believe will, before long, be ready to be placed in charge of the police.

More indictable offences are reported to have been committed than in the previous year, and more persons have also been apprehended and committed for trial; for offences also which are determined summarily more persons have been proceeded against.

As respects vagrants, the number who have been provided with shelter by the police and passed to lodging-houses is stated to have amounted to 5,657 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

No. 3.
South of England
and South Wales
District.

Borough of
Bridgewater.

BOROUGH of BRIDGEWATER.

Force - - - - 7 persons.

Area in acres - - - -	976	Acres to each constable - - -	139
Population in 1861 - - -	11,320	Population to ditto, as per census 1861,	1,617

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 5.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-		-	-	1	-	-	-	5					
Rates of Pay of each, ditto -	£. 125	-	-	-	-	-	-	-	-	-	s. d. 22 6	-	-	-	s. d. 20 6					

The police force of this borough, which was reported last year to be in an inefficient state, has undergone no change during the year.

The indictable offences which have been reported are considerably less in number than in the previous year, and fewer persons have been apprehended and committed for trial. For offences also which are determined summarily, fewer persons have been proceeded against.

The population of the borough is considerable, and the police force is too limited in number to provide for the proper patrolling and watching of the district under their charge by day and by night.

BOROUGH of CHARD.

Borough of
Chard.

Force - - - - 2 persons.

Area in acres - - - -	50	Acres to each constable - -	25
Population in 1861 - - -	2,276	Population to ditto, as per census 1861,	1,138

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 2.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2					
Rates of Pay of each, ditto -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 14					

No alteration has taken place during the year in the number of the police of this borough.

There is no proper police station, and the cell, which was reported to be dark, damp, and unfit for the detention of prisoners, has undergone no alteration.

No. 3.
South of England and South Wales District.

SURREY.

County of Surrey.

Force - - - - - 133 persons.

Area in acres - - - - 371,032 | Acres to each constable - - - 2,789
Population in 1861 - - - 115,315 | Population to ditto, as per census 1861, 867

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - - 5.					Inspectors. Total No. - 7.				Serjeants. Total No. - 12.				Constables. Total No. - 108.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	3	1	–	–	7	–	–	–	6	6	–	–	45	45	18			
Rates of Pay of each, ditto -	£. 400	£. 135	£. 100	£. 95	–	–	£. 70	–	–	–	s. 25	s. 23	–	–	s. 21	s. 20	s. 19			

Chief Constable.—Horse and travelling allowance, 100 *l.*

Superintendents.—Horses, carts, stabling provided, and 3 *s.* per diem allowed for forage and shoeing.

In this county the rates of pay of the police have undergone revision and alteration during the year, and two classes of serjeants have been established, but the force has not been increased in number.

In addition to the ordinary pay, allowances are also granted to those officers who are appointed to act as inspectors of nuisances and weights and measures, and as assistant relieving officers.

The station-houses are all in good order, and the new station at Chertsey, which was not completed at the time of my inspection, is now finished and placed in charge of the police.

The indictable offences which have been reported are considerably less in number than in the previous year, and much fewer persons have been apprehended and committed for trial. For offences also which are determined summarily there is a considerable decrease in the number of persons who have been proceeded against.

As respects vagrants the number who have been passed by the police to lodging houses and the unions is stated to have amounted to 889 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

BOROUGH OF GODALMING.

Borough of Godalming.

Force - - - - - 2 persons.

Area in acres - - - - - 480 | Acres to each constable - - - 240
Population in 1861 - - - - 2,321 | Population to ditto, as per census 1861, 1,160

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1					
Rates of Pay of each, ditto -	£. s. 54 12	–	–	–	–	–	–	–	–	–	–	–	–	–	s. 17					

No. 3.
South of England and South Wales District.

The police force of this borough has undergone no change during the year.

Four indictable offences are reported to have been committed, for which six persons were apprehended and five committed for trial. For offences which are determined summarily, 15 persons were proceeded against.

In order to provide for the proper patrolling and watching of the borough by day and night, the services of another constable are required.

Borough of Guildford.

Borough of Guildford.

Force - - - - - 15 persons.

Area in acres - - - - -	531	Acres to each constable - - -	35
Population in 1861- - - -	8,020	Population to ditto, as per census 1861,	534

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 13.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	2	3	8			
Rates of Pay of each, ditto -	£. 90	-	-	-	-	-	-	-	-	-	s. 25	-	-	-	s. 22	s. 20	s. 18			

No alteration has taken place during the year in the number or pay of this force.

Fewer indictable offences are reported to have taken place than in the previous year, and the apprehensions and committals for trial have also been considerably less in number. Fewer persons have also been proceeded against for offences which are determined summarily.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

Borough of Reigate.

Borough of Reigate.

Force - - - - - 14 persons.

Area in acres - - - -	5,909	Acres to each constable - - -	422
Population in 1861 - - -	9,974	Population to ditto, as per census 1861,	712

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 12.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	12					
Rates of Pay of each, ditto -	£. 102	-	-	-	-	-	-	-	-	-	s. 24	-	-	-	s. 20					

An augmentation of two constables was made to the police force of this borough in the month of August last, on the recommendation of the inspector, in order to provide better protection in the outlying districts, and the pay of the officers and constables was also increased.

The cells at present in use are confined and defective in ventilation; the corporation, however, have in contemplation the building of a new police station with

No. 3.
South of England
and South Wales
District.

with properly constructed lock-up places in proximity to the town-hall and court-house.

Three offences of an indictable character are reported to have taken place as against 14 in the previous year, and for such offences five persons were apprehended and bailed for trial. For offences which are determined summarily, 93 persons were proceeded against; in the previous year the number similarly dealt with amounted to 46 persons.

The duties are now satisfactorily provided for, and I consider the force to be in an efficient state.

SUSSEX (East Division).

Sussex (East Division).

Force - - - - - 114 persons.

Area in acres - - - -	503,813	Acres to each constable - - -	4,419
Population in 1861 - - -	135,620	Population to ditto, as per census 1861,	1,189

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										
	Chief Constable.	Superintendents. Total No. - - 8.					Inspectors.				Serjeants. Total No. - 15.				Constables. Total No. - - 82.						
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.	7th Class.
Number of each Rank and Class	1	1	6	1	–	–	–	–	–	–	6	9	–	–	1	1	7	22	2	23	34
Rates of Pay of each, ditto	£. 350	£. 150	£. 110	£. 90	–	–	–	–	–	–	s. 26	s. 24	–	–	s. d. 22 6	s. 22	s. d. 21 6	s. 21	s. 20	s. d. 19 6	s. 18

Chief Constable.—Horse and travelling allowance, 100 *l.*
Superintendents—Provide their own horses, but are allowed 50 *l.* each for forage, shoeing, stabling, &c.

In this division of the county an augmentation of three serjeants and eight constables has been made to the police force during the year, but in other respects the force has undergone no alteration.

In addition to the ordinary pay, remuneration is also granted to those officers and constables who act as inspectors of nuisances.

To each class of constables is established a class of merit with additional pay and a distinguishing badge, but it has this disadvantage, that when a merit-class constable is promoted to a higher class he has to drop the distinguishing badge of merit until he has performed some act, or so conducted himself as to deserve it again in the class to which he is promoted.

The station-houses are generally in good order; but in the one at Eastbourne the warming of the cells is not effectively provided for, and the walls are sometimes damp.

The indictable offences which have been reported are less in number than in the previous year; but more persons have been committed for trial, and more persons also proceeded against for offences which are determined summarily.

The number of vagrants who have been provided with shelter by the police, and also passed to the unions, is stated to have amounted to 1,137 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

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South of England
and South Wales
District.

Borough of
Brighton.

Borough of Brighton.

Force - - - - 101 persons.

Area in acres - - - - 2,320 | Acres to each constable - - - 23
Population in 1861 - - - 77,693 | Population to ditto, as per census 1861, 796

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents. Total No. - - 2.					Inspectors. Total No. - - 8.				Serjeants. Total No. - 4.				Constables. Total No. - - - 86					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	2	–	–	–	–	1	7	–	–	4	–	–	–	1	3	30	10	37	5
Rates of Pay of each, ditto	£. 250	£. 140	–	–	–	–	£. 110	£. 78	–	–	s. 26	–	–	–	s. 36	s. 30	s. 24	s. 22	s. 20	s. d. 17 6

An augmentation of 10 constables has been made to the police force of this borough during the year, and some changes have also been carried into effect in respect to the numbers forming the different classes of the constables.

The indictable offences which have been reported are about the same in number as in the previous year, but fewer persons have been apprehended and committed for trial. For offences, however, which are determined summarily, more persons have been proceeded against.

The cells in the head-quarter station, which are situated beneath the town-hall, have undergone no alteration; they are dark, badly ventilated, and quite unfit for the confinement of prisoners.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

Borough of Hastings.

Borough of
Hastings.

Force - - - - 27 persons.

Area in acres - - - - 1,750 | Acres to each constable - - - 64
Population in 1861 - - - 22,837 | Population to ditto, as per census 1861, 845

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 6.				Constables. Total No. - - - 20					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	5	1	–	–	4	5	2	9		
Rates of Pay of each, ditto	£. 160	–	–	–	–	–	–	–	–	–	s. d. 25 6	s. d. 23 6	–	–	s. d. 21 6	s. d. 20 6	s. d. 19 6	s. d. 18 6		

An augmentation of four constables has been made to the police force of this borough during the year, and a progressive scale of pay for length of service has been established.

Constables on joining receive 18 *s.* per week; after one year's service, 19 *s.* 6 *d.* per week; after two years' service, 20 *s.* 6 *d.* per week; after three years' service, 21 *s.* 6 *d.* per week; and after every other three years' service, an additional 1 *s.* per week. The serjeants commence at 23 *s.* 6 *d.*, and, in like manner to the constables, are allowed additional pay for increased service.

The offences of an indictable character which have been reported are less in number than in the previous year, and fewer persons have been apprehended and committed

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South of England,
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committed for trial. For offences also which are determined summarily fewer persons have been proceeded against.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

Town of Hove.

Town of Hove.

Force - - - - - - 23 persons.

Area in acres - - - -	712	Acres to each constable - - -	31
Population in 1861 - - -	9,624	Population to ditto, as per census 1861,	418

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 3.				Constables. Total No. - - - 19.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	3	–	–	–	11	1	7			
Rates of Pay of each, ditto -	£. 130	–	–	–	–	–	–	–	–	–	s. 28	–	–	–	s. 24	s. 22	s. 20			

No alteration has taken place during the year in the number or pay of the police of this town.

The cells are well constructed and maintained in a cleanly state.

The indictable offences which have been reported are the same in number as in the previous year, but fewer persons have been committed for trial, and also rather fewer persons proceeded against for offences which are determined summarily.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

Borough of Rye.

Borough of Rye

Force - - - - - - 2 persons.

Area in acres - - - -	1,120	Acres to each constable - - -	560
Population in 1861 - - -	3,738	Population to ditto, as per census 1861,	1,869

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - - - 2.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1				
Rates of Pay of each, ditto -	–	–	–	–	–	–	–	–	–	–	–	–	–	–	s. 20	s. 16				

The police force of this borough has undergone no alteration during the year.

The indictable offences which have been reported are rather more in number than the previous year, but the same number of persons have been committed for trial, and the same number of persons also proceeded against for offences which are determined summarily.

The number of vagrants who are reported to have been provided with shelter by the police is stated to have been 68 persons.

The area of this borough is too extensive to be properly watched by day and night by a force composed of only two constables.

No. 3.
South of England
and South Wales
District.

SUSSEX (West Division).

County of Sussex (West Division).

Force - - - - - - 78 persons.

Area in acres - - - - 412,379 | Acres to each constable - - 5,286
Population in 1861 - - - 98,799 | Population to ditto, as per census 1861, 1,266

RANKS.	Yearly pay in £. and Shillings.											Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - - 6.					Inspectors.				Serjeants. Total No. - 6.				Constables. Total No. - 65.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	5	-	-	-	-	-	-	-	6	-	-	-	25	25	15			
Rates of Pay of each, ditto -	£. 300	£. 110	£. 104	-	-	-	-	-	-	-	s. d. 23 6	-	-	-	s. 21	s. d. 19 6	s. 18			

Chief Constable.—Horse and travelling allowance, 100 *l.*
Superintendents.—Horses, carts, forage, stabling, &c., provided.

In this division of the county no change has taken place during the year either in the number or pay of the police, but the number of the respective classes of the constables have undergone alteration. Formerly the lowest class was the most numerous, and consequently little promotion took place amongst the constables; now the two highest classes are made the most numerous, and consequently to a good many of the constables an increase of pay has been granted, and a greater chance of speedy advancement generally afforded.

One officer only is appointed to act as an inspector of nuisances, and for the extra duties which the office imposes upon him, he is allowed 10 *l.* yearly, in addition to his pay; no remuneration is granted to those officers who are appointed to act as inspectors of low lodging-houses and weights and measures.

The station-houses are in good order in all respects.

The indictable offences which have been reported are more in number than in the previous year, and more persons have been apprehended and committed for trial. For offences which are determined summarily about the same number of persons have been proceeded against as in the previous year.

The duties are generally satisfactorily provided for, and I consider the force to be in an efficient state.

Borough of Arundel.

Borough of Arundel.

Force - - - - - - 3 persons.

Area in acres - - - - 1,968 | Acres to each constable - - - 656
Population in 1861 - - - 2,498 | Population to ditto, as per census 1861 - 832

RANKS.	Yearly Pay in £. and Shillings.											Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 2.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2					
Rates of Pay of each, ditto -	£. s. 55 18	-	-	-	-	-	-	-	-	-	-	-	-	-	s. 19					

The

No. 3.
South of England
and South Wales
District.

The police force of this borough has undergone no alteration during the year.

No offences of an indictable character are reported to have taken place, but 48 persons were proceeded against for offences which are determined summarily.

The number of vagrants who were provided with shelter and relief, and passed to lodging-houses by the police, are stated to have amounted to 1,306 persons.

The duties for the town portion of the borough are well provided for, but more constables are required to afford proper protection in the country area of the borough, which is extensive.

CITY of CHICHESTER.

City of Chichester.

Force - - - - - 8 persons.

Area in acres - - - -	1,680	Acres to each constable - - -	210
Population in 1861 - - -	8,059	Population to ditto, as per census 1861,	1,007

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - 6.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	1	-	-	-	6					
Rates of Pay of each, ditto -	£. 18	-	-	-	-	-	-	-	-	-	s. 21	-	-	-	s. 18					

The police force of this city has undergone no alteration during the year either in numbers or pay.

Fewer indictable offences are reported to have taken place than in the previous year, and fewer persons have been apprehended and committed for trial. For offences also which are determined summarily much fewer persons have been proceeded against.

As respects vagrants, 125 are reported to have been passed by the police to the union for shelter and relief.

The duties are generally well provided for, and I consider the force to be in an efficient state.

WILTSHIRE.

County of Wilts,
including the
Boroughs of Calne,
Chippenham,
Devizes, and
Marlborough.

Force - - - - - 201 persons.

Area in acres - - - -	799,033	Acres to each constable - -	3,975
Population in 1861 - - -	237,033	Population to ditto, as per census 1861,	1,179

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - - 10.					Inspectors. Total No. - 13.				Serjeants. Total No. - 26.				Constables. Total No. - - - 151.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	2	4	1	3	-	13	-	-	-	26	-	-	-	50	80	10	11		
Rates of Pay of each, ditto -	£. 500	£. 130	£. 110	£. 95	£. 85	-	£. s. 67 12	-	-	-	s. 22	-	-	-	s. 20	s. 18	s. 16	s. 15		

Chief Constable.—Horse and travelling allowance, 50 *l.*

Superintendents.—Horses, carts, stabling provided, and 2 *s.* per diem allowed for forage, and 7 *s.* 6 *d.* per quarter for shoeing.

No. 3.
South of England, and South Wales District.

In this county an alteration has been made in the pay of the chief constable, by raising it from 400 *l.* to 500 *l.* per annum, but the allowance for travelling has been reduced from 100 *l.* to 50 *l.* per annum.

Each superintendent, after serving in that rank for 10 years, receives an addition to his yearly pay of 10 *l.*; but in the other ranks no progressive scale of pay for length of service has been established.

No remuneration beyond the ordinary pay is granted in this force to any of the officers or constables who are appointed to act as inspectors of nuisances, low lodgings, weights and measures, or who undertake the duties appertaining to any other offices.

The indictable offences which have been reported are more in number than in the previous year, but rather fewer persons have been committed for trial, and fewer persons also proceeded against for offences which are determined summarily.

The number of vagrants who have been sheltered by the police, and passed to lodging-houses and the unions, are stated to have amounted to 7,413 persons.

The station-houses are in good order in all respects. The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

CITY OF SALISBURY.

Force - - - - - 12 persons.

City of Salisbury.

Area in acres - - - -	660	Acres to each constable - - -	55
Population in 1861 - - -	12,278	Population to ditto, as per census 1861,	1,023

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 2.				Constables. Total No. - 9.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	2	–	–	–	5	4				
Rates of Pay of each, ditto -	£. 120	–	–	–	–	–	–	–	–	–	s. 25	–	–	–	s. 21	s. 19				

The police force of this city has undergone no alteration during the year either in numbers or pay; in addition, however, to the pay of the two serjeants, as above stated, an allowance of 25 *l.* yearly is granted to them for acting as inspectors of nuisances and low lodging-houses.

The indictable offences which have been reported are less in number than in the previous year, and fewer persons have been apprehended and committed for trial; for offences also which are determined summarily fewer persons have been proceeded against.

The duties are, generally, fairly provided for, and I consider the force to be efficient.

No. 3.
South of England
and South Wales
District.

County of Brecon

BRECONSHIRE.

Force - - - - - 34 persons.

Area in acres - - - -	456,125	Acres to each constable - -	13,415
Population in 1861 - - -	56,392	Population to ditto, as per census 1861,	1,658

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - - - 2.					Inspectors.				Serjeants. Total No. - 7.				Constables. Total No. - - 24.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	2	–	–	–	–	–	–	–	–	3	4	–	–	6	11	7			
Rates of Pay of each, ditto -	£. 250	£. 90	–	–	–	–	–	–	–	–	s. 23	s. 21	–	–	s. 21	s. 19	s. 17			

Chief Constable.—Horse and travelling allowance, 50 *l.*
Superintendents.—Provide their own horses, and are allowed 50 *l.* each for keep, &c.

In this county the police force has undergone no change either in numbers or pay during the year; I am, however, of opinion that a couple more constables are now required in the mining districts of Beaufort and Brinmawr, which are become very populous.

In addition to the ordinary duties, the police are also appointed to act as inspectors of weights and measures, low lodging houses, and weights and measures, but no remuneration is attached to such appointments.

The indictable offences which have been reported are more in number than in the previous year, but the same number of persons have been committed for trial. For offences which are determined summarily more persons have been proceeded against.

The number of vagrants who were passed by the police to lodging houses, amounted to 907 persons.

The cells in the station at Hay are very close and badly ventilated, and the plan which has been adopted for warming those in the Brinmawr station is not effective.

The duties are, generally, fairly provided for, but I am of opinion that at least two more constables are required in the mining districts to which I have above referred.

BOROUGH of BRECKNOCK.

Force - - - - - 4 persons.

Borough of
Brecknock.

Area in acres - - - -	6,426	Acres to each constable - -	1,606
Population in 1861 - - -	5,235	Population to ditto, as per census 1861,	1,308

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 3.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	–	–	–	–	3					
Rates of Pay of each, ditto -	£. s. 54 12	–	–	–	–	–	–	–	–	–	–	–	–	–	s. 18					

No. 3.
South of England and South Wales District.

No alteration has taken place during the year in the number or pay of the police force of this borough.

Two indictable offences only are reported to have been committed, for which two persons were apprehended and committed for trial. For offences which are determined summarily 130 persons were proceeded against.

The number of vagrants who were passed by the police to the union for shelter is stated to have amounted to 1,048 persons.

The police of this borough are too few in number to provide for the proper watching and protection of the district under their charge, which is extensive.

CARDIGANSHIRE.

Force - - - - - 35 persons.

County of Cardigan, including the Boroughs of Cardigan and Aberystwith.

Area in acres - - - -	443,387	Acres to each constable - -	12,668
Population in 1861 - - -	72,245	Population to ditto, as per census 1861,	2,064

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
		Superintendents. Total No. - - 6					Inspectors.				Serjeants. Total No. - 5.				Constables. Total No. - 27.					
	Chief Constable.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class,	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	1	-	-	-	-	-	-	-	5	-	-	-	8	15	4			
Rates of Pay of each, ditto -	£. 250	£. 150	£. 75	-	-	-	-	-	-	-	s. 23	-	-	-	s. 21	s. 19	s. 17			

Chief Constable.—Horse and travelling allowance, 50 *l.*
Superintendents.—Provide their own horses, and are allowed 50 *l.* each for keep, &c.

No alteration has taken place during the year in the number or pay of this force.

One officer only is appointed to act as inspector of weights and measures, and a larger salary is allowed to him than to the other superintendent, who has no duty of this kind to perform.

The station which it was proposed to build at Tregaron has not yet been commenced, nor have any steps been taken to provide a better station and lock-up at Aberystwith, where it is much needed.

A station with a couple of cells is, I think, required in Llandyssil, which is situated about half way between Lampeter and Newcastle Emlys, and which has now become the terminus of a railway.

The indictable offences which have been reported are rather less in number than in the previous year, but more persons have been apprehended and committed for trial for such offences, and also more persons proceeded against for offences which are determined summarily.

The duties are generally well provided for, and I consider the force to be in an efficient state.

No. 3.
South of England
and South Wales
District.

CARMARTHENSHIRE.

Force - - - - - 50 persons.

County of Carmarthen.

Area in acres - - - -	620,214	Acres to each constable - -	12,404
Population in 1861 - - -	101,803	Population to ditto, as per census 1861,	2,036

RANKS.	Yearly Pay in £. and Shillings.										Weekly pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - - 3.					Inspectors.				Serjeants. Total No. - 10.				Constables. Total No. - - - 36.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	3	–	–	–	–	–	–	–	–	10	–	–	–	9	27				
Rates of Pay of each, ditto -	£. 300	£. 140	–	–	–	–	–	–	–	–	s. 24	–	–	–	s. 20	s. 18				

Chief Constable.—No allowance for horse or travelling; expenses out of pocket.
Superintendents.—Provide their own horses, and are allowed 50*l.* for keep, &c.

In this county an increase has been made to pay of the serjeants, but in other respects the force has undergone no change during the year.

Some of the police are appointed to act as assistant relieving officers and Custom House officers, and also as conservators of rivers, under the Salmon Fisheries Act, but no extra pay or allowances are granted for the duties attendant upon such offices.

Two new police stations are in the course of construction, one at Llansawel, and the other at Llanboidy; each station will be provided with a couple of cells, and accomodation for a resident serjeant and constable.

The cells in the stations at Newcastle Emlyn have undergone no alteration; they are quite unfit for the detention of prisoners, being without ventilation, and almost totally dark. The indictable offences which have been reported are much fewer in number than in the previous year, as also have been the apprehensions and committals for trial, and a considerable decrease is also reported to have taken place in the number of persons who have been proceeded against for offences which are determined summarily.

The number of vagrants who have been passed by the police to lodging houses and the unions, is stated to have amounted to 775 persons; the duties are well provided for, and I consider the force to be in an efficient state.

BOROUGH OF CARMARTHEN.

Force - - - - - 12 persons.

Borough of Carmarthen.

Area in acres - - - -	5,009	Acres to each constable - - -	417
Population in 1861 - - -	9,993	Population to ditto, as per census 1861,	832

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 2.				Constables. Total No. - - - 9.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	2	–	–	–	9					
Rates of Pay of each, ditto -	£. 120	–	–	–	–	–	–	–	–	–	s. 23	–	–	–	s. 18					

No. 3.
South of England and South Wales District.

No alteration has taken place during the year in the number of the police force of this borough, but an increase of pay has been granted to the serjeant of 2 *s.* per week; the indictable offences which have been reported are more in number than in the previous year, and more persons have been committed for trial; for offences also which are determined summarily more persons have been proceeded against.

The duties are generally well provided for, and I consider the force to be in an efficient state.

GLAMORGANSHIRE.

Force - - - - - - 127 persons.

County of Glamorgan, including the Borough of Aberavon,

Area in acres - - - - 523,712 | Acres to each constable - - - 4,123
Population in 1861 - - - 236,382 | Population to ditto, as per census 1861, 1,861

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - - 4.					Inspectors.				Serjeants. Total No. - 17.				Constables. Total No. - - 105.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	3	-	-	-	-	-	-	-	17	-	-	-	36	69				
Rates of Pay of each, ditto -	£. 300	£. 150	£. 140	-	-	-	-	-	-	-	*s.* 25	-	-	-	*s.* 22	*s.* 20				

Chief Constable.—Horse and travelling allowance, 150 *l.*

Superintendents—Provide their own horses, and are allowed 53 *l.* each for keep, &c.

In this county an increase of six constables has been made to the police force during the year, but in other respects the force has undergone no change.

The superintendents are appointed to act as Inspectors of Weights and Measures and low lodging houses, and also with others of the police as Inspectors of Nuisances, but no extra pay or allowances are granted for the duties attendant upon such offices.

A new police station is in the course of erection at Penarth, which is becoming an important seaport town, and the station at Aberdare, which was reported to be wanting in accommodation for the police, is being enlarged; improvements are also being made in the station at Merthyr.

The indictable offences which have been reported are less in number than in the previous year, and fewer persons have been committed for trial; for offences, however, which are determined summarily, more persons have been proceeded against.

As respects vagrants, the number who have been provided with shelter by the police, and passed to lodging houses and the unions, is reported to have amounted to 3,030 persons.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

No. 3.
South of England and South Wales District.

Borough of Cardiff.

Borough of Cardiff.

Force - - - - - 45 persons.

Area in acres - - - -	2,321	Acres to each constable - - -	51
Population in 1861 - - -	32,954	Population to ditto, as per census 1861,	732

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors. Total No. - 2.				Serjeants. Total No. - 7.				Constables. Total No. - - 35.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	2	–	–	–	7	–	–	–	24	10	1			
Rates of Pay of each, ditto	£. 200	–	–	–	–	–	£. s. 72 16	–	–	–	s. 25	–	–	–	s. 22	s. 20	s. 15			

No alteration has taken place during the year in the number of the police force of this borough.

More indictable offences are reported to have taken place than in the previous year, but fewer persons have been committed for trial, and also fewer persons proceeded against for offences which are determined summarily.

The number of vagrants who are reported to have been provided with food and shelter by the police during the year are stated to have amounted to 6,331 persons, but no record has been kept of those who were passed to the union, and who were composed of women and children.

The duties are satisfactorily provided for, and I consider the force to be in an efficient state.

Borough of Neath.

Borough of Neath.

Force - - - - 8 persons.

Area in acres - - - -	1,121	Acres to each constable - - .	140
Population in 1861 - - -	6,810	Population to ditto, as per census 1861,	851

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants. Total No. - 1.				Constables. Total No. - - 6.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	1	–	–	–	3	3				
Rates of Pay of each, ditto	£. s. d. 91 8 8	–	–	–	–	–	–	–	–	–	s. d. 25 6	–	–	–	s. d. 21 6	s. d. 19 6				

An augmentation of three constables was made to the police force of this borough in the month of September last, and the pay of the officers and constables was increased; the augmentation, however, was made too late in the year to admit of a certificate of efficiency being granted for the past financial year.

Fifty indictable offences are reported to have taken place, for which 50 persons were apprehended and 20 committed for trial. For offences which are determined summarily, 382 persons are reported to have been proceeded against.

No. 3.
South of England and South Wales District.

No comparison can be made with previous years, as no returns have heretofore been furnished.

As respects vagrants, 1,230 are reported to have been passed by the police to the different lodging houses for shelter.

The duties are now satisfactorily provided for; but as the force was only augmented to its present strength in the month of September last, I am under the necessity of placing it for the year just ended in the category of forces which have been maintained in an inefficient state.

BOROUGH OF SWANSEA.

Borough of Swansea.

Force - - - - - 45 persons.

Area in acres - - - -	5,400	Acres to each constable - - -	120
Population in 1861 - - -	41,606	Population to ditto, as per census 1861,	924

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors. Total No. - - 3.				Serjeants. Total No. - 5.				Constables. Total No. - - 36.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	2	1	–	–	5	–	–	–	21	11	4			
Rates of Pay of each, ditto -	£. 170	–	–	–	–	–	£. s. 79 4	£. s. 71 8	–	–	s. d. 25 6	–	–	–	s. d. 22 6	s. d. 20 6	s. d. 18 6			

An augmentation of one constable has been made to the police force of this borough during the year.

The indictable offences which have been reported are rather more in number than in the previous year, and more persons have been apprehended for such offences, but fewer persons committed for trial, and also fewer persons proceeded against for the class of offences which are determined summarily.

The number of vagrants who have been passed by the police to the union when food and shelter are granted, are stated to have amounted to 1,235 persons.

The duties are generally fairly provided for, and I consider the force to be efficient.

PEMBROKESHIRE.

County of Pembroke.

Force - - - - 50 persons.

Area in acres - - - -	340,274	Acres to each constable - - -	6,805
Population in 1861 - - -	86,277	Population to ditto, as per census 1861,	1,725

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - - 2.					Inspectors.				Serjeants. Total No. - 6.				Constables. Total No. - - 41.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	2	–	–	–	–	–	–	–	–	6	–	–	–	5	6	14	16		
Rates of Pay of each, ditto -	£. 275	£. 120	–	–	–	–	–	–	–	–	s. 23	–	–	–	s. 21	s. 20	s. 18	s. 16		

Chief Constable.—Horse and travelling allowance, 25 *l.*

Superintendents.—Provide their own horses, and are allowed 25 *l.* each for keep, &c.

An

No. 3.
South of England and South Wales District.

An augmentation of one constable has been made to the police force of this county during the year, but in other respects the force has undergone no change.

In addition to the ordinary duties, the police are also appointed to act as inspectors of weights and measures, low lodging houses, and nuisances, and also as assistant relieving officers, and excise officers, and as conservators of rivers, under the Salmon Fisheries Act; and generally without any remuneration beyond the regular pay, except to those who act as inspectors of nuisances and as assistant relieving officers.

The station houses are maintained in a cleanly state, the one, however, which is situated at Maenclohog is very small, and much too limited in accommodation for a married officer, and it would not be desirable to place an unmarried officer in charge of a station with cells. The indictable offences which have been reported are considerably less in number than in the previous year, as are also the apprehensions and committals for trial for such offences; fewer persons have also been proceeded against for the class of offences which are determined summarily.

The number of vagrants who have been passed by the police to lodging houses and the unions, are reported to have amounted to 1,302 persons.

The duties are generally well provided for, and I consider the force to be in an efficient state.

BOROUGH of HAVERFORDWEST.

Borough of Haverfordwest.

Force - - - - 4 persons

Area in acres - - - -	1,760	Acres to each constable - -	440
Population in 1861 - - -	7,019	Population to ditto, as per census 1861,	1,754

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constables, or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - 3.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3					
Rates of Pay of each, ditto -	£. 100	-	-	-	-	-	-	-	-	-	-	-	-	-	s. d. 16 6					

No alteration has taken place during the year in the number of the police force of this borough; but the yearly pay of the superintendent has been increased 10 *l.*

The state of crime, as regards indictable offences, is the same as in the previous year; and the same number of persons have been apprehended and committed for trial. For offences, however, which are determined summarily, more persons have been proceeded against.

The number of vagrants who are reported to have been passed by the police to lodging houses is stated to have amounted to 554 persons.

The present superintendent has improved the state of this force very much; but the number of the force is insufficient to provide for the proper watching of the borough, the area of which is very extensive.

No. 3.
South of England
and South Wales
District.

Borough of Tenby.

Force - - - - 2 persons.

Borough of Tenby.

Area in acres - - - - 350 | Acres to each constable - - - 175
Population in 1861 - - - 2,982 | Population to ditto, as per census 1861, 1,491

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Head Constable or Chief Superintendent.	Superintendents.					Inspectors.				Serjeants.				Constables. Total No. - - 1.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.
Number of each Rank and Class	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1					
Rates of Pay of each, ditto	£. s. 57 4	–	–	–	–	–	–	–	–	–	–	–	–	–	s. 20					

No alteration has taken place during the year in the number or pay of the police force of this borough.

There is no proper police station, and the cells, which are in a detached building, are dark, cold, and damp, and quite unfit in their present condition for the confinement of prisoners.

The indictable offences which have been reported, and the apprehensions and committals for trial, are the same as in the previous year, viz.: two in number in each case, and 83 persons were proceeded against summarily, being one more person so dealt with as compared with the previous year.

The number of vagrants who were provided with shelter by the police during the year are stated to have amounted to 82 persons.

In this borough the services of another constable are required, in order to afford proper protection by day and by night.

RADNORSHIRE.

Force - - - - 16 persons.

County of Radnor.

Area in acres - - - 273,111 | Acres to each constable - - - 18,207
Population in 1861 - - 25,382 | Population to ditto, as per census 1861, 1,586

RANKS.	Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.									
	Chief Constable.	Superintendents. Total No. - - 2.					Inspectors.				Serjeants. Total No. - 2.				Constables. Total No. - - 11.					
		1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2nd Cass.	3d Class.	4h Class.	5th Class.	6th Class.
Number of each Rank and Class	1	1	1	–	–	–	–	–	–	–	2	–	–	–	5	6				
Rates of Pay of each, ditto	£. 85	£. 90	£. 80	–	–	–	–	–	–	–	s. 23	–	–	–	s. 21	s. 19				

Chief constable.—Horse and travelling allowance, 30 *l.*
Superintendents.—Provide their own horses, but are allowed for maintenance, &c., one 50 *l.*, and the other 40 *l.* per annum.

No. 3
South of Engla
and South W
District.

No alteration has taken place during the year in the number or pay of the police of this county.

The superintendents, in addition to their ordinary duties, are appointed to act as inspectors of weights and measures, but no additional pay is granted for such duties; to three of the constables, however, who act as assistant relieving officers, a small remuneration is accorded.

Two new police stations are in the course of construction, one at Rhayader, and the other at Knighton; at Presteign, a better station is also required, as the accommodation in the present station is very limited, and the cells also badly constructed.

The indictable offences which have been reported are considerably less than in the previous year, and very much fewer persons have also been apprehended and committed for trial. For offences, however, which are determined summarily rather more persons have been proceeded against.

The number of vagrants who have been passed by the police to lodging houses during the year are stated to have amounted to 1,182 persons.

The duties are generally well provided for, and I consider the force to be in an efficient state.

RETURN showing the Number of each POLICE ESTABLISHMENT, and the Number of each Rank respectively,

Consecutive Number.	COUNTIES AND BOROUGHS.	Police Establishments. 29th September 1864.	Police Establishments. 29th September 1865.	RANK AND NUMBER. Chief Officers. Counties.	RANK AND NUMBER. Chief Officers. Boroughs.	RANK AND NUMBER. Superintendents.	RANK AND NUMBER. Inspectors.	RANK AND NUMBER. Serjeants.	RANK AND NUMBER. Constables.	Area in Square Acres.	Population, Census 1861.	Proportions of Area and Population to each Constable. Acres.	Proportions of Area and Population to each Constable. Population.	Chief Officers. Pay. £.	Chief Officers. Pay. s.	Chief Officers. Pay. d.	Chief Officers. Allowances.
	ENGLAND:																
1	BERKSHIRE	114	114	1	–	8	2	12	91	442,022	125,955	3,877	1,104	400	–	–	150 *l.* yearly
2	Abingdon	6	6	–	1	–	–	1	4	340	5,680	57	946	91	–	–	- -
3	Maidenhead	3	3	–	1	–	–	–	2	2,560	3,895	853	1,286	72	12	–	- -
4	Newbury	8	8	–	1	–	–	1	6	1,722	6,161	215	770	81	18	–	- -
5	Reading	32	32	–	1	–	3	5	23	1,922	25,045	60	782	130	–	–	- -
6	Windsor	13	13	–	1	–	–	2	10	2,890	9,520	222	732	83	4	–	- -
7	CORNWALL	191	191	1	–	7	10	18	155	863,077	316,568	4,518	1,657	350	–	–	150 *l.* yearly
8	Bodmin	1	1	–	1	–	–	–	–	2,784	4,466	- -	- -	18	–	–	- -
9	Falmouth	4	4	–	1	–	–	–	3	40	5,709	10	1,427	55	–	–	- -
10	Helston	1	1	–	1	–	–	–	–	292	3,843	- -	- -	52	–	–	- -
11	Launceston	1	1	–	–	–	–	–	1	2,880	2,790	- -	- -	-		-	- -
12	Liskeard	2	2	–	–	–	–	–	2	810	4,689	405	2,344	-		-	- -
13	Penryn	2	2	–	–	–	–	–	2	298	3,547	149	1,773	-		-	- -
14	Penzance	7	7	–	1	–	–	1	5	440	9,414	62	1,347	34	2	–	- -
15	St. Ives	1	1	–	1	–	–	–	–	1,876	7,027	- -	- -	40	–	6	- -
16	Truro	6	6	–	1	–	–	1	4	1,103	11,337	183	1,889	78	–	–	- -
17	DEVONSHIRE	334	334	1	–	14	–	34	285	1,616,717	399,535	4,840	1,196	400	–	–	200 *l.* yearly
18	Barnstaple	10	10	–	1	–	–	1	8	2,549	10,743	254	1,074	118	10	–	- -
19	Bideford	2	2	–	1	–	–	–	1	4,510	5,742	2,255	2,871	72	16	–	- -
20	*Bradninch	1	* now united with the county for police purposes.					–	–	- -	- -	- -	- -	-		-	- -
21	Devonport	46	46	–	1	–	3	5	37	2,380	50,440	51	1,096	120	–	–	- -
22	Exeter	37	37	–	1	–	4	4	28	1,800	33,738	48	911	150	–	–	- -
23	Plymouth	73	75	–	1	–	5	8	61	600	62,599	8	834	170	–	–	- -
24	South Molton	2	2	–	1	–	–	–	1	6,264	3,830	3,132	1,915	78	–	–	- -
25	Tiverton	7	7	–	1	–	–	1	5	17,650	10,447	2,521	1,492	78	–	–	- -
26	Torrington	2	2	–	1	–	–	–	1	3,456	3,298	1,728	1,649	52	–	–	- -
27	Totnes	3	3	–	1	–	–	–	2	1,254	4,001	418	1,333	66	–	–	- -
28	DORSETSHIRE	133	133	1	–	10	–	11	111	624,758	159,303	4,697	1,197	300	–	–	150 *l.* yearly
29	Blandford	2	2	–	–	–	–	–	2	27	1,521	13½	760	-		-	- -
30	Dorchester	7	7	–	1	–	–	1	5	571	6,823	81	974	60	–	–	- -
31	Poole	14	14	–	1	–	–	1	12	4,749	9,759	339	697	105	1	8	- -
32	Weymouth	12	12	–	1	–	–	2	9	1,600	11,383	133	948	120	–	–	- -
33	GLOUCESTERSHIRE	288	288	1	–	11	–	44	232	787,414	351,602	2,734	1,220	450	–	–	100 *l.* -
34	Bristol	303	303	–	1	–	5	38	259	4,683	154,093	15	508	380	–	–	50 *l.* -
35	HAMPSHIRE	259	259	1	–	14	1	23	220	1,053,777	310,576	4,068	1,199	400	–	–	100 *l.* yearly
36	Basingstoke	5	5	–	1	–	–	1	3	4,036	4,654	807	930	65	–	–	- -
37	Newport (Isle of Wight)	5	5	–	1	–	–	–	4	156	7,934	31	1,586	75	–	–	- -
38	Portsmouth	95	95	–	1	–	6	13	75	4,515	94,799	47	787	190	–	–	- -
39	Romsey	2	2	–	1	–	–	–	1	248	2,116	124	1,058	49	8	–	- -
40	Southampton	57	57	–	1	–	1	10	45	2,630	46,960	46	823	200	–	–	- -
41	Winchester	15	15	–	1	–	–	2	12	1,043	14,776	69	985	104	–	–	- -
42	HEREFORDSHIRE	62	62	1	–	9	–	12	40	510,686	102,359	8,236	1,650	255	–	–	90 *l.* yearly
43	Hereford	30	30	–	1	–	1	3	25	4,670	15,585	155	519	115	–	–	- -
44	Leominster	8	8	–	1	–	–	1	6	7,284	5,658	910	707	109	–	–	- -
45	KENT	262	262	1	–	13	2	24	222	945,566	362,771	4,180	1,384	400	–	–	200 *l.* yearly
46	Canterbury	21	21	–	1	–	2	2	16	3,568	21,324	169	1,015	100	–	–	- -
47	Deal	8	8	–	1	–	–	1	6	1,159	7,531	144	941	65	–	–	- -
48	Dover	25	25	–	1	–	4	–	20	3,500	25,325	140	1,013	140	–	–	- -
49	Faversham	7	7	–	1	–	–	1	5	2,036	5,858	290	836	100	–	–	- -
50	Folkestone	11	11	–	1	–	–	1	9	2,697	8,507	245	773	121	10	–	- -
51	Gravesend	22	22	–	1	–	–	4	17	1,271	18,782	57	853	121	19	4	- -
52	Hythe	2	2	–	1	–	–	–	1	882	3,001	441	1,500	65	–	–	- -
53	Maidstone	23	23	–	1	–	2	2	18	4,232	23,016	184	1,000	155	11	4	- -

* Bradninch had an independent police in 1864, since then it has been united with the county for police purposes; but no augmentation has been made to the county force.

together with the AREA, POPULATION, and RATES of PAY granted to each Class of Officers and Constables.

PAY AND ALLOWANCES.

Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										Consecutive Number.
Superintendents.						Inspectors.				Serjeants.				Constables.						
1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	Allowances.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.	
£.	£. s.	£. s.	£.	£.		£. s.	£. s.	£. s.	£.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
100	90 –	80 –	–	–	Horses, &c., provided	70 –	–	–	–	25 –	23 –	–	–	21 –	19 –	17 –	–	–	–	1
–	–	–	–	–	- - -	–	–	–	–	21 –	–	–	–	17 –	–	–	–	–	–	2
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	20 –	–	–	–	–	–	3
–	–	–	–	–	- - -	–	–	–	–	21 –	–	–	–	17 –	7 –	–	–	–	–	4
–	–	–	–	–	- - -	6 7 12	65 –	62 8	–	22 –	–	–	–	20 –	18 6	17 –	–	–	–	5
–	–	–	–	–	- - -	–	–	–	–	20 –	19 –	–	–	18 –	–	–	–	–	–	6
125	95 –	85 –	–	–	Horses, &c., provided	65 –	–	–	–	23 –	22 –	–	–	20 –	18 –	–	–	–	–	7
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	21 –	18 –	–	–	–	–	9
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	21 –	–	–	–	–	–	11
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	20 –	–	–	–	–	–	12
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	21 –	–	–	–	–	–	13
–	–	–	–	–	- - -	–	–	–	–	21 6	–	–	–	18 6	17 6	–	–	–	–	14
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15
–	–	–	–	–	- - -	–	–	–	–	21 –	–	–	–	17 6	–	–	–	–	–	16
150	103 6	88 6	91*l.*, clerk	–	45 *l.* each, yearly	–	–	–	–	23 –	20 –	–	–	20 –	18 –	16 –	–	–	–	17
–	–	–	–	–	- - -	–	–	–	–	23 11	–	–	–	17 –	16 1	–	–	–	–	18
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	18 –	–	–	–	–	–	19
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	–	–	–	–	–	–	20
–	–	–	–	–	- - -	68 18	–	–	–	23 6	–	–	–	19 7	18 5	–	–	–	–	21
–	–	–	–	–	- - -	62 8	–	–	–	21 –	–	–	–	19 –	18 –	17 –	–	–	–	22
–	–	–	–	–	- - -	110 –	79 6	68 18	–	23 6	22 –	–	–	21 –	19 –	17 6	16 6	–	–	23
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	16 6	–	–	–	–	–	24
–	–	–	–	–	- - -	–	–	–	–	21 –	–	–	–	19 –	15 –	–	–	–	–	25
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	15 –	–	–	–	–	–	26
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	18 –	–	–	–	–	–	27
150	130 –	95 –	85	–	Horses, &c., provided	–	–	–	–	23 –	–	–	–	20 –	18 –	17 –	–	–	–	28
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	16 –	–	–	–	–	–	29
–	–	–	–	–	- - -	–	–	–	–	21 6	–	–	–	18 6	–	–	–	–	–	30
–	–	–	–	–	- - -	–	–	–	–	22 –	–	–	–	20 –	19 –	18 –	–	–	–	31
–	–	–	–	–	- - -	–	–	–	–	23 –	–	–	–	20 –	19 –	–	–	–	–	32
140	130 –	120 –	100	–	40 *l.* each yearly	–	–	–	–	21 6	–	–	–	19 –	16 –	–	–	–	–	33
–	–	–	–	–	- - -	117 –	–	–	–	30 –	26 –	25 –	24 –	20 –	18 –	16 –	–	–	–	34
136	130 –	120 –	–	–	Horses, &c., provided	75 4	–	–	–	25 –	–	–	–	21 –	19 –	17 –	–	–	–	35
–	–	–	–	–	- - -	–	–	–	–	22 –	–	–	–	18 –	17 –	–	–	–	–	36
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	18 –	–	–	–	–	–	37
–	–	–	–	–	- - -	85 –	–	–	–	26 –	–	–	–	23 6	21 –	19 –	–	–	–	38
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	17 –	–	–	–	–	–	39
–	–	–	–	–	- - -	79 6	–	–	–	26 6	–	–	–	23 6	21 6	19 6	–	–	–	40
–	–	–	–	–	- - -	–	–	–	–	22 –	–	–	–	20 –	–	–	–	–	–	41
98	90 –	82 –	–	–	One, 48 *l.* yearly; ,, 44 *l.* yearly; ,, 40 *l.* yearly.	–	–	–	–	23 –	21 –	–	–	19 –	17 –	–	–	–	–	42
–	–	–	–	–	- - -	59 16	–	–	–	21 –	–	–	–	20 –	19 –	18 –	17 –	10 –	–	43
–	–	–	–	–	- - -	–	–	–	–	21 8	–	–	–	17 8	16 8	–	–	–	–	44
139 18 4	130 15 10	118 12 6	–	–	Horses, &c., provided	109 10	–	–	–	28 –	24 6	–	–	22 9	21 –	18 8	–	–	–	45
–	–	–	–	–	- - -	68 18	–	–	–	24 6	–	–	–	19 6	–	–	–	–	–	46
–	–	–	–	–	- - -	–	–	–	–	20 –	–	–	–	17 6	15 –	–	–	–	–	47
–	–	–	–	–	- - -	–	–	–	–	25 –	–	–	–	21 –	20 –	19 –	–	–	–	48
–	–	–	–	–	- - -	–	–	–	–	24 6	–	–	–	19 6	–	–	–	–	–	49
–	–	–	–	–	- - -	–	–	–	–	25 –	–	–	–	20 6	19 6	–	–	–	–	50
–	–	–	–	–	- - -	–	–	–	–	28 11	–	–	–	24 9	22 9	21 9	20 9	–	–	51
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	20 –	–	–	–	–	–	52
–	–	–	–	–	- - -	81 18	–	–	–	28 5	26 5	–	–	22 4	21 3	20 3	19 3	–	–	53

0.10.

RETURN showing the Number of each Police Establishment, and the Number of each Rank respectively,

Consecutive Number.	COUNTIES AND BOROUGHS.	Police Establishments. 29th September 1864.	Police Establishments. 29th September 1865.	Rank and Number. Chief Officers. Counties.	Rank and Number. Chief Officers. Boroughs.	Superintendents.	Inspectors.	Serjeants.	Constables.	Area in Square Acre.	Population, Census 1861.	Proportions of Area and Population to each Constable. Acres.	Proportions of Area and Population to each Constable. Population.	Chief Officers. Pay. £. s. d.	Chief Officers. Allowances.
	ENGLAND—*continued.*														
	KENT—*continued.*														
54	Margate	10	10	- -	1	- -	- -	2	7	240	8,874	24	887	110 – –	- -
55	Ramsgate	13	13	- -	1	- -	- -	2	10	260	11,865	20	912	115 – –	- -
56	Rochester	31	32	- -	1	- -	- -	6	25	2,715	16,862	84	527	114 – –	- -
57	Sandwich	1	1	- -	1	- -	- -	- -	- -	703	2,944	- -	- -	28 – –	- -
58	Tenterden	4	4	- -	1	- -	- -	- -	3	8,394	3,762	2,098	940	30 – –	- -
59	Tonbridge Wells	17	21	- -	1	- -	1	2	17	3,350	13,807	159	657	125 9 –	- -
60	MONMOUTHSHIRE	98	98	1	- -	4	4	14	75	364,087	145,711	3,715	1,486	350 – –	100 *l.* yearly
61	Monmouth	6	6	- -	1	- -	- -	1	4	5,407	5,783	901	963	82 14 –	- -
62	Newport	25	26	- -	1	- -	1	5	19	996	23,249	38	894	130 – –	- -
63	SOMERSETSHIRE	285	286	1	- -	16	- -	24	245	1,051,498	358,824	3,676	1,254	500 – –	200 *l.* -
64	Bath	88	88	- -	1	- -	6	13	68	3,745	52,528	42	596	250 – –	- -
65	Bridgewater	7	7	- -	1	- -	- -	1	5	976	11,320	139	1,617	125 – –	- -
66	Chard	2	2	- -	- -	- -	- -	- -	2	50	2,276	25	1,138	- -	- -
67	SURREY	133	133	1	- -	5	7	12	108	371,032	115,315	2,789	867	400 – –	- -
68	Godalming	2	2	- -	1	- -	- -	- -	1	480	2,321	240	1,160	54 12 –	- -
69	Guildford	15	15	- -	1	- -	- -	1	13	531	8,020	35	534	90 – –	- -
70	Reigate	12	14	- -	1	- -	- -	1	12	5,909	9,974	422	712	102 – –	- -
71	SUSSEX, EAST	103	114	1	- -	8	- -	15	90	503,813	135,620	4,419	1,189	350 – –	100 *l.* yearly
72	Brighton	91	101	- -	1	2	8	4	86	2,320	77,693	23	769	250 – –	- -
73	Hastings	23	27	- -	1	- -	- -	6	20	1,750	22,837	64	845	160 – –	- -
74	Hove	23	23	- -	1	- -	- -	3	19	712	9,624	31	418	130 – –	- -
75	Rye	2	2	- -	- -	- -	- -	- -	2	1,120	3,738	560	1,869	- -	- -
76	SUSSEX, WEST	78	78	1	- -	6	- -	6	65	412,379	98,799	5,286	1,266	300 – –	100 *l.* yearly
77	Arundel	3	3	- -	1	- -	- -	- -	2	1,968	2,498	656	832	55 18 –	- -
78	Chichester	8	8	- -	1	- -	- -	1	6	1,680	8,059	210	1,007	80 – –	- -
79	WILTSHIRE	201	201	1	- -	10	13	26	151	799,033	237,033	3,975	1,179	500 – –	50 *l.* -
80	Salisbury	12	12	- -	1	- -	- -	2	9	660	12,278	55	1,023	120 – –	- -
		3,880	3,915	14	59	137	91	438	3,176						
	WALES:														
81	BRECONSHIRE	34	34	1	- -	2	- -	7	24	466,125	56,392	13,415	1,658	250 – –	50 *l.* yearly
82	Brecon	4	4	- -	1	- -	- -	- -	3	6,426	5,235	1,606	1,308	54 12 –	- -
83	CARDIGANSHIRE	35	35	1	- -	2	- -	5	27	443,387	72,245	12,668	2,064	250 – –	50 *l.* yearly
84	CARMARTHENSHIRE	50	50	1	- -	3	- -	10	36	620,214	101,803	12,404	2,036	300 – –	Expenses paid out of pocket.
85	Carmarthen	12	12	- -	1	- -	- -	2	9	5,009	9,993	417	832	120 – –	- -
86	GLAMORGANSHIRE	121	127	1	- -	4	- -	17	105	523,712	236,382	4,123	1,861	300 – –	150 *l.* yearly
87	Cardiff	45	45	- -	1	- -	2	7	35	2,321	32,954	51	732	200 – –	- -
88	Neath	5	8	- -	1	- -	- -	1	6	1,121	6,810	140	851	91 8 8	- -
89	Swansea	44	45	- -	1	- -	3	5	36	5,400	41,606	120	924	170 – –	- -
90	PEMBROKESHIRE	49	50	1	- -	2	- -	6	41	340,274	86,277	6,805	1,725	275 – –	25 *l.* yearly
91	Haverfordwest	4	4	- -	1	- -	- -	- -	3	1,760	7,019	440	1,754	100 – –	- -
92	Tenby	2	2	- -	1	- -	- -	- -	1	350	2,982	175	1,491	57 4 –	- -
93	RADNORSHIRE	16	16	1	- -	2	- -	2	11	273,111	25,382	18,207	1,586	85 – –	30 *l.* yearly
	TOTAL South Wales	421	432	6	7	15	5	62	337						
	TOTAL South of England	3,880	3,915	14	59	137	91	438	3,176						
	GROSS TOTAL	4,301	4,347	20	66	152	96	500	3,513						

ogether with the Area, Population, and Rates of Pay granted to each Class of Officers and Constables—*continued.*

PAY AND ALLOWANCES.

Yearly Pay in £. and Shillings.										Weekly Pay in Shillings and Pence.										Consecutive Number.
Superintendents.						Inspectors.				Serjeants.				Constables.						
1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	Allowances.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	6th Class.	
£.	£.	£.	£	£.		£. s.	£. s.	£.	£.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
–	–	–	–	–	- - -	–	–	–	–	25 –	–	–	–	20 –	–	–	–	–	–	54
–	–	–	–	–	- - -	–	–	–	–	24 –	–	–	–	21 –	19 –	–	–	–	–	55
–	–	–	–	–	- - -	–	–	–	–	27 7	25 7	–	–	21 7	20 7	19 7	19 –	–	–	56
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	–	–	–	–	–	–	57
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	18 –	–	–	–	–	–	58
–	–	–	–	–	- - -	79 9	–	–	–	26 8	24 8	–	–	21 6	20 6	19 6	18 6	–	–	59
125	120	115	110	–	60 *l.* each yearly	78 –	–	–	–	25 –	–	–	–	21 –	20 –	18 –	–	–	–	60
–	–	–	–	–	- - -	–	–	–	–	19 7	–	–	–	18 7	–	–	–	–	–	61
–	–	–	–	–	- - -	90 –	–	–	–	28 6	26 6	–	–	22 6	20 6	18 6	–	–	–	62
140	120	90	–	–	46 *l.* each yearly	–	–	–	–	23 –	–	–	–	20 –	18 –	–	–	–	–	63
–	–	–	–	–	- - -	100 –	85 16	78 –	–	30 –	24 –	–	–	24 –	21 –	19 –	18 –	17 –	–	64
–	–	–	–	–	- - -	–	–	–	–	22 6	–	–	–	20 6	–	–	–	–	–	65
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	14 –	–	–	–	–	–	66
135	100	95	–	–	Horses provided, and 3 *s.* daily for forage.	70 –	–	–	–	25 –	23 –	–	–	21 –	20 –	19 –	–	–	–	67
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	17 –	–	–	–	–	–	68
–	–	–	–	–	- - -	–	–	–	–	25 –	–	–	–	22 –	20 –	18 –	–	–	–	69
–	–	–	–	–	- - -	–	–	–	–	24 –	–	–	–	20 –	–	–	–	–	–	70
150	110	90	–	–	20 *l.* each yearly	–	–	–	–	26 –	24 –	–	–	22 6	21 6	21 –	20 –	19 6	18 –	71
140	–	–	–	–	- - -	110 –	78 –	–	–	26 –	–	–	–	36 –	30 –	24 –	22 –	20 –	17 6	72
–	–	–	–	–	- - -	–	–	–	–	25 6	23 6	–	–	21 6	20 6	19 6	18 6	–	–	73
–	–	–	–	–	- - -	–	–	–	–	28 –	–	–	–	24 –	22 –	20 –	–	–	–	74
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	20 –	16 –	–	–	–	–	75
110	104	–	–	–	Horses, &c., provided.	–	–	–	–	23 6	–	–	–	21 –	19 6	18 –	–	–	–	76
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	19 –	–	–	–	–	–	77
–	–	–	–	–	- - -	–	–	–	–	21 –	–	–	–	18 –	–	–	–	–	–	78
130	110	95	85	–	Horses provided, and 7 *s.* 6 *d.* allowed quarterly for shoeing.	67 12	–	–	–	22 –	–	–	–	20 –	18 –	16 –	15 –	–	–	79
–	–	–	–	–	- - -	–	–	–	–	25 –	–	–	–	21 –	19 –	–	–	–	–	80
90	–	–	–	–	50 *l.* each yearly	–	–	–	–	23 –	21 –	–	–	21 –	19 –	17 –	–	–	–	81
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	18 –	–	–	–	–	–	82
150	75	–	–	–	50 *l.* each yearly	–	–	–	–	23 –	–	–	–	21 –	19 –	17 –	–	–	–	83
140	–	–	–	–	50 *l.* each yearly	–	–	–	–	24 –	–	–	–	20 –	18 –	–	–	–	–	84
–	–	–	–	–	- - -	–	–	–	–	23 –	–	–	–	18 –	–	–	–	–	–	85
150	140	–	–	–	53 *l.* each yearly	–	–	–	–	25 –	–	–	–	22 –	20 –	–	–	–	–	86
–	–	–	–	–	- - -	72 16	–	–	–	25 –	–	–	–	22 –	20 –	15 –	–	–	–	87
–	–	–	–	–	- - -	–	–	–	–	25 6	–	–	–	21 6	19 6	–	–	–	–	88
–	–	–	–	–	- - -	79 4	71 8	–	–	25 6	–	–	–	22 6	20 6	18 6	–	–	–	89
120	–	–	–	–	25 *l.* each yearly	–	–	–	–	23 –	–	–	–	21 –	20 –	18 –	16 –	–	–	90
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	16 6	–	–	–	–	–	91
–	–	–	–	–	- - -	–	–	–	–	–	–	–	–	20 –	–	–	–	–	–	92
90	80	–	–	–	One, 50*l.* One, 40*l.* } yearly	–	–	–	–	23 –	–	–	–	21 –	19 –	–	–	–	–	93

RETURN of GENERAL INFORMATION, with the State of CRIME in the

Consecutive Numbers.	COUNTIES and BOROUGHS.	Population (Census, 1861).	Public Houses.		Beer Houses.		Refreshment Houses with Wine Licenses.		Tramp or Low Lodging Houses.		Number of Tramps found in the Low Lodging Houses on the Return Night.	Number of Vagrants Relieved or Sheltered through the aid of the Police during the Year.						
			Number of Houses.	Number Convicted during the Year.	Number of Houses.	Number Convicted during the Year.	Number of Houses.	Number Convicted during the Year.	Number of Houses.	Number Convicted during the Year.		At Places in charge of the Police.	Sent to Lodging Houses.	Sent to the Unions.	Total Men.	Total Women.	Total Children.	GROSS TOTAL.
	ENGLAND:																	
1	BERKSHIRE - -	125,955	531	3	352	14	–	–	11	–	129	–	–	6,915	5,014	1,155	746	6,915
2	Abingdon - -	5,680	60	5	11	1	2	–	4	–	–	–	–	–	–	–	–	–
3	Maidenhead -	3,895	30	–	17	–	–	–	3	–	–	–	–	–	–	–	–	–
4	Newbury - -	6,161	41	2	22	2	2	–	5	–	45	–	–	1,572	624	428	520	1,572
5	Reading - -	25,045	108	–	140	4	1	–	8	–	–	2,970	–	–	2,209	456	305	2,970
6	Windsor - -	9,520	36	–	35	3	7	–	8	–	–	–	–	–	–	–	–	–
7	CORNWALL - -	316,568	684	44	166	20	–	–	44	–	157	–	–	143	85	31	27	143
8	Bodmin - -	4,466	17	–	2	–	–	–	4	–	–	–	–	–	–	–	–	–
9	Falmouth - -	5,709	19	–	7	–	6	–	1	–	–	–	–	–	–	–	–	–
10	Helston - -	3,843	15	–	2	–	–	–	3	–	–	–	–	–	–	–	–	–
11	Launceston - -	2,790	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
12	Liskeard - -	4,689	18	5	1	–	–	–	3	–	–	–	–	–	–	–	–	–
13	Penryn - -	3,547	17	–	1	–	–	–	2	–	–	–	–	–	–	–	–	–
14	Penzance - -	9,414	24	3	29	6	3	1	5	1	21	–	–	–	–	–	–	–
15	St. Ives - -	7,027	14	3	2	1	–	–	–	–	–	–	–	–	–	–	–	–
16	Truro - -	11,837	44	3	17	1	9	–	5	–	36	–	–	–	–	–	–	–
17	DEVONSHIRE - -	399,535	1,352	65	370	23	20	–	44	1	97	634	1,516	1,061	2,575	398	238	3,211
18	Barnstaple - -	10,743	84	3	–	–	–	–	3	–	48	–	6	2	3	2	3	8
19	Bideford - -	5,742	53	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–
20	Devonport - -	50,440	146	20	120	17	–	–	–	–	1	–	–	–	–	–	–	–
21	Exeter - -	33,738	119	8	23	5	9	1	12	2	–	–	–	–	–	–	–	–
22	Plymouth - -	62,599	173	13	254	63	19	3	18	–	118	348	–	246	526	51	17	594
23	Southmolton -	3,830	25	–	3	–	–	–	1	–	–	–	–	–	–	–	–	–
24	Tiverton - -	10,447	39	–	5	1	–	–	4	–	–	–	–	–	–	–	–	–
25	Torrington - -	3,298	17	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–
26	Totnes - -	4,001	27	–	5	–	–	–	1	–	–	–	–	–	–	–	–	–
27	DORSETSHIRE - -	159,303	448	5	330	14	2	–	4	–	97	–	86	1,572	1,402	154	102	1,658
28	Blandford - -	1,521	10	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–
29	Dorchester - -	6,823	36	1	4	–	2	–	1	–	8	9	–	–	2	4	3	9
30	Poole - -	9,759	44	4	34	3	3	–	2	–	27	–	–	–	–	–	–	–
31	Weymouth - -	11,383	61	–	30	–	2	–	5	–	26	29	–	196	191	15	19	225
32	GLOUCESTERSHIRE -	351,602	1,018	27	1,070	67	24	3	81	1	731	–	5,059	7,580	10,177	1,560	902	12,639
33	Bristol - -	154,093	461	–	649	–	11	–	24	–	–	–	–	–	–	–	–	–
34	HAMPSHIRE - -	310,576	1,120	14	812	28	31	–	5	–	254	–	–	7,892	7,075	817	–	7,892
35	Basingstoke - -	4,654	33	–	17	–	1	–	1	–	22	–	–	–	–	–	–	–
36	Newport, Isle of Wight.	7,934	53	2	16	–	2	–	4	–	–	–	–	–	–	–	–	–
37	Portsmouth - -	94,799	278	10	630	52	17	–	11	–	154	–	–	2,722	2,323	213	186	2,722
38	Romsey - -	2,116	10	–	11	1	–	–	–	–	–	–	–	–	–	–	–	–
39	Southampton -	46,960	155	19	215	17	28	1	11	–	315	–	–	–	–	–	–	–
40	Winchester - -	14,776	94	–	45	–	2	–	6	–	107	–	–	–	–	–	–	–
41	HEREFORDSHIRE - -	102,359	273	7	211	15	–	–	35	–	53	–	–	4,501	3,688	502	311	4,501
42	Hereford - -	15,585	99	7	36	3	5	–	15	1	40	–	–	–	–	–	–	–
43	Leominster - -	5,658	40	3	2	1	1	–	7	–	14	–	–	–	–	–	–	–
44	KENT - - - -	362,771	1,054	15	831	44	21	–	30	–	498	–	–	3,349	2,317	757	275	3,349
45	Canterbury - -	22,824	164	12	8	5	5	–	4	–	91	87	–	120	90	60	57	207
46	Deal - - -	7,531	70	–	19	2	–	–	3	–	28	48	–	–	39	7	2	48
47	Dover - -	25,322	203	17	12	1	3	–	7	–	92	–	–	1,080	845	140	95	1,080
48	Faversham - -	5,858	37	1	7	1	–	–	–	–	–	–	–	–	–	–	–	–
49	Folkestone - -	8,507	66	1	5	1	9	–	3	–	55	86	–	–	40	30	16	86
50	Gravesend - -	18,782	87	12	43	9	7	–	13	3	299	–	–	5,303	2,897	1,530	876	5,303
51	Hythe - -	3,001	14	–	6	–	–	–	1	–	–	–	–	–	–	–	–	–
52	Maidstone - -	23,016	72	5	111	1	2	–	9	–	32	291	–	–	170	80	41	291
53	Margate - -	8,874	52	–	4	–	–	–	2	–	17	–	–	–	–	–	–	–
54	Ramsgate - -	11,865	63	1	19	1	2	1	3	–	42	–	–	–	–	–	–	–
55	Rochester - -	16,862	82	2	37	2	4	–	5	–	58	–	–	–	–	–	–	–

SOUTH POLICE DISTRICT, for the Year ended the 29th September 1865.

Indictable Offences during the Year ended the 29th September 1865.							Offences determined Summarily during the Year ended the 29th September 1865.									Salmon Fisheries Act.		Poaching Act, 1862.		Consecutive Number.
										Committed, as under, to										
Crimes Committed.	Apprehended.	Discharged.	Bailed.	Bailed for Trial.	Committed for want of Sureties.	Committed for Trial.	Persons proceeded against.	Discharged.	Convicted.	Prison.	Reformatories.	Industrial Schools.	Fined.	Other Punishments.	Delivered up to Army or Navy.	Number of Cases Reported.	Number of Cases obtaining Convictions.	Number of Cases Reported.	Number of Cases obtaining Convictions.	
162	127	35	1	10	–	80	1,330	292	1,038	366	5	–	616	39	12	–	–	3	3	1
7	7	–	–	–	–	7	106	45	61	32	–	–	24	5	–	–	–	–	–	2
63	63	11	–	–	–	5	63	11	52	–	–	–	16	36	–	–	–	–	–	3
15	16	3	–	6	–	7	95	32	63	19	–	–	37	7	–	–	–	–	–	4
47	38	13	–	4	–	21	423	199	224	102	1	–	109	9	3	–	–	–	–	5
32	32	13	1	–	–	18	350	205	145	47	–	–	90	4	4	–	–	–	–	6
190	213	54	–	19	–	140	3,933	957	2,976	357	–	–	2,194	410	15	18	17	41	37	7
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
11	11	–	–	–	–	11	194	46	148	85	3	–	56	1	–	–	–	–	–	9
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	11
2	2	–	–	–	–	2	29	4	25	5	–	–	16	4	–	–	–	–	–	12
5	7	5	–	–	–	2	23	7	16	3	–	–	13	–	–	–	–	–	–	13
2	4	2	–	–	–	2	262	36	226	68	–	–	154	4	–	–	–	–	–	14
1	1	–	–	1	–	1	79	14	65	4	–	–	57	4	–	–	–	–	–	15
20	15	4	–	1	–	10	274	110	164	70	–	–	91	3	–	–	–	–	–	16
441	371	115	2	20	1	233	4,892	1,222	3,670	792	26	3	2,741	97	11	46	40	12	8	17
7	6	1	–	–	–	5	154	32	122	28	–	2	91	1	–	8	7	–	–	18
4	4	3	–	1	–	1	45	22	23	6	–	–	17	–	–	–	–	–	–	19
64	53	7	–	5	–	41	416	133	383	156	5	1	213	8	–	–	–	–	–	20
50	41	–	–	10	–	31	258	32	226	113	2	2	105	–	4	–	–	–	–	21
58	67	19	–	5	–	43	1,181	536	645	245	–	7	388	3	2	–	–	–	–	22
2	2	–	–	1	–	1	38	7	31	17	–	–	14	–	–	–	–	–	–	23
5	5	–	–	–	–	5	144	30	107	21	–	–	–	–	–	–	–	–	–	24
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	25
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	26
130	121	28	–	4	–	89	2,343	521	1,822	449	2	2	1,199	101	69	–	–	12	12	27
–	–	–	–	–	–	–	39	5	34	6	–	–	27	–	1	–	–	–	–	28
18	18	2	–	–	–	16	132	38	94	45	–	–	28	2	19	–	–	–	–	29
17	15	4	–	–	–	11	292	124	168	45	1	–	100	17	5	–	–	–	–	30
8	9	3	–	–	–	6	195	57	138	76	3	–	50	9	–	–	–	–	–	31
185	470	107	1	39	–	323	3,665	1,097	2,568	867	6	1	1,566	123	5	23	22	2	2	32
261	201	75	–	1	–	125	5,722	3,306	2,416	772	32	25	1,484	86	17	–	–	–	–	33
647	555	205	–	22	–	328	4,387	1,390	2,997	1,050	2	–	1,726	130	89	3	3	40	32	34
5	4	1	–	–	–	3	138	25	113	19	–	–	81	–	13	–	–	–	–	35
24	24	10	–	1	–	13	126	40	86	12	–	–	63	–	2	–	–	–	–	36
497	144	45	–	1	–	98	1,899	769	1,130	778	12	–	317	15	8	–	–	–	–	37
4	4	1	–	–	–	3	29	7	22	5	–	–	17	–	–	3	3	–	–	38
32	38	3	–	4	–	30	1,460	569	891	495	4	–	325	29	38	–	–	–	–	39
47	32	3	–	5	–	24	157	43	114	62	–	–	40	10	2	–	–	–	–	40
181	126	44	–	8	–	74	1,684	543	1,141	205	3	–	658	275	–	5	5	15	11	41
83	64	15	–	6	–	43	694	291	403	92	–	–	300	11	–	–	–	–	–	42
12	13	2	1	1	–	9	233	97	136	40	–	–	94	–	–	–	–	2	2	43
491	419	54	1	27	–	337	3,485	825	2,660	955	6	–	1,285	211	203	–	–	16	16	44
13	13	–	–	–	–	13	237	96	126	–	–	–	–	–	–	–	–	–	–	45
18	13	5	–	–	–	8	197	93	104	37	–	–	55	10	2	–	–	–	–	46
22	25	3	–	1	21	22	622	290	332	213	3	–	116	–	–	–	–	–	–	47
1	1	–	–	–	–	1	95	17	78	35	–	–	41	1	1	–	–	–	–	48
16	18	–	–	3	–	18	145	38	107	54	–	–	48	–	5	–	–	2	2	49
55	18	9	1	–	–	8	922	278	644	221	3	–	387	8	25	–	–	3	1	50
2	2	–	–	–	–	2	34	4	30	17	–	–	12	1	–	–	–	–	–	51
75	21	1	–	–	–	20	251	81	170	96	1	–	60	1	12	–	–	–	–	52
8	8	–	–	–	–	8	231	73	158	63	–	–	86	9	–	–	–	–	–	53
26	14	4	–	4	–	6	192	43	149	76	–	–	63	10	–	–	–	–	–	54
10	10	1	–	–	–	9	333	141	192	50	–	–	121	–	21	–	–	–	–	55

RETURN of General Information, with the State of Crime in the

Consecutive Number.	COUNTIES. and BOROUGHS.	Population (Census, 1861).	Public Houses.		Beer Houses.		Refreshment Houses with Wine Licenses.		Tramp or Low Lodging Houses.		Number of Tramps found in the Low Lodging Houses on the Return Night.	Number of Vagrants Relieved or Sheltered through the Aid of the Police during the Year.						
			Number of Houses.	Number Convicted during the Year.	Number of Houses.	Number Convicted during the Year.	Number of Houses.	Number Convicted during the Year.	Number of Houses.	Number Convicted during the Year.		At Places in charge of the Police.	Sent to Lodging Houses.	Sent to the Unions.	Total Men.	Total Women.	Total Children.	Gross Total.
	ENGLAND—*continued.*																	
	Kent—*continued.*																	
56	Sandwich - -	2,944	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
57	Tenderden - -	3,762	6	–	5	–	–	–	3	–	–	–	–	419	236	83	100	419
58	Tunbridge Wells -	13,807	31	5	34	7	–	–	5	–	126	–	698	–	573	96	29	698
59	MONMOUTHSHIRE -	145,711	546	36	416	100	4	–	53	3	151	–	3,183	1,780	4,219	465	279	4,963
60	Monmouth - -	5,783	69	5	3	–	–	–	11	2	7	–	–	1,937	1,696	152	89	1,937
61	Newport - -	23,249	91	18	137	29	13	–	15	1	115	–	–	4,326	3,558	360	408	4,326
62	SOMERSETSHIRE - -	358,824	881	53	777	27	8	–	47	2	323	–	635	–	437	139	59	635
63	Bath - - -	52,528	179	5	94	3	8	–	7	–	19	3,091	2,566	–	4,836	574	247	5,657
64	Bridgewater -	11,320	55	–	43	–	–	–	3	–	–	–	–	–	–	–	–	–
65	Chard - - -	2,276	12	–	6	–	–	–	2	–	–	–	–	–	–	–	–	–
66	SURREY - - -	115,315	507	23	248	24	1	–	21	–	778	–	158	731	430	294	165	889
67	Godalming - -	2,321	13	–	9	1	–	–	2	–	–	–	–	2	–	–	2	2
68	Guildford - -	8,020	41	3	21	5	3	–	4	–	70	–	–	–	–	–	–	–
69	Reigate - -	9,974	31	–	28	–	3	–	3	–	–	–	–	–	–	–	–	–
70	SUSSEX, EAST - -	135,620	373	5	257	20	3	–	24	–	604	148	–	989	780	224	133	1,137
71	Brighton - -	77,693	254	4	208	6	9	–	43	–	253	–	–	–	–	–	–	–
72	Hastings - -	22,837	77	3	40	2	4	–	2	–	30	–	–	–	–	–	–	–
73	Hove - - -	9,624	18	–	15	–	3	–	–	–	–	–	–	–	–	–	–	–
74	Rye - - -	3,738	25	2	7	1	2	–	1	–	–	62	6	–	52	12	4	68
75	SUSSEX, WEST - -	98,799	327	5	215	4	14	–	12	–	252	–	–	–	–	–	–	–
76	Arundel - -	2,498	12	1	11	1	–	–	3	–	50	1,140	166	–	984	160	162	1,306
77	Chichester - -	8,059	49	–	33	1	–	–	7	–	–	–	–	125	47	45	33	125
78	WILTSHIRE - - -	237,033	667	8	334	8	5	–	29	–	182	1,874	2,891	2,648	5,317	1,422	674	7,413
79	Salisbury - -	12,278	60	1	7	–	2	–	3	1	–	–	–	–	–	–	–	–
	TOTAL English Counties and Boroughs		14,214	519	9,747	608	339	10	796	18	6,662	10,817	16,970	57,211	65,457	12,416	7,125	84,998
	WALES:																	
80	BRECONSHIRE - -	56,392	342	30	142	38	–	–	41	3	89	–	749	158	739	122	46	907
81	Brecon - -	5,235	61	2	1	–	–	–	3	–	11	–	–	1,048	985	43	20	1,048
82	CARDIGANSHIRE - -	72,245	342	7	17	–	–	–	31	–	99	–	–	–	–	–	–	–
83	CARMARTHENSHIRE -	101,803	717	13	16	1	5	–	32	–	88	–	101	674	640	73	62	775
84	Carmarthen - -	9,993	106	2	–	–	–	–	6	–	16	–	–	–	–	–	–	–
85	GLAMORGANSHIRE -	236,382	493	81	1,013	155	4	–	83	–	681	75	935	2,930	2,940	90	–	3,030
86	Cardiff - -	32,954	135	1	151	39	3	–	26	11	207	6,331	–	–	6,331	–	–	6,331
87	Neath - - -	6,810	45	4	27	7	3	–	6	–	–	–	1,230	–	1,230	–	–	1,230
88	Swansea - -	41,606	289	6	101	4	1	–	30	1	108	–	–	1,235	1,149	43	43	1,235
89	PEMBROKESHIRE -	86,277	471	9	31	–	–	–	34	–	43	–	896	406	1,124	92	86	1,302
90	Haverfordwest -	7,019	62	10	–	–	2	–	6	–	30	–	554	–	436	81	37	554
91	Tenby - - -	2,982	32	–	1	–	2	–	–	–	–	69	–	–	30	20	19	69
92	RADNORSHIRE - -	25,382	113	3	41	17	–	–	21	–	26	–	1,182	–	967	181	84	1,182
	TOTAL Welsh Counties and Boroughs -		3,208	168	1,541	261	20	–	319	15	1,398	6,475	5,640	6,451	16,571	695	397	17,663
	TOTAL English Counties and Boroughs		14,214	519	9,747	608	339	10	796	18	6,662	10,817	16,970	57,211	65,457	12,416	7,125	84,998
	GROSS TOTALS SOUTH POLICE DISTRICT		17,422	687	11,288	869	359	10	1,115	33	8,060	17,292	22,610	63,662	82,028	13,111	7,522	102,661

N.B.—The Boroughs of Bodmin, Launceston, Torrington, Totnes, South Police District, for the Year ended the 29th September 1865—*continued.*

Indictable Offences during the Year ended the 29th September 1865.							Offences determined Summarily during the Year ended the 29th September 1865.									Salmon Fisheries Act.		Poaching Act, 1862.		
										Committed, as under, to										
Crimes Committed.	Apprehended.	Discharged.	Bailed.	Bailed for Trial.	Commited for want of Sureties.	Committed for Trial.	Persons proceeded against.	Discharged.	Convicted.	Prison.	Reformatories.	Industrial Schools.	Fined.	Other Punishments.	Delivered up to Army or Navy.	Number of Cases Reported.	Number of Cases obtaining Convictions.	Number of Cases Reported.	Number of Cases obtaining Convictions.	Consecutive Number.
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	56
1	1	–	–	–	–	1	7	–	7	3	–	–	4	–	–	–	–	–	–	57
34	29	6	–	4	3	16	233	53	180	64	2	–	94	19	1	–	–	–	–	58
201	157	40	3	29	–	85	3,223	649	2,574	441	2	–	1,975	148	8	19	15	1	1	59
16	12	5	–	1	–	6	195	61	134	30	–	–	91	13	–	–	–	–	–	60
108	95	37	–	6	–	52	1,477	383	1,094	212	–	–	774	107	1	–	–	–	–	61
365	368	69	–	49	–	250	5,524	1,421	4,103	833	7	–	2,995	249	19	–	–	23	16	62
285	138	37	–	5	–	96	1,205	472	735	327	17	5	277	106	3	–	–	–	–	63
4	4	1	–	–	–	3	223	68	132	24	–	–	108	23	–	–	–	–	–	64
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	65
99	99	37	1	14	–	47	1,250	381	869	264	4	–	514	12	75	–	–	–	–	66
5	6	1	1	1	3	5	25	3	22	–	–	–	6	–	–	–	–	–	–	67
14	8	7	–	–	–	1	274	66	208	50	–	–	125	–	33	–	–	–	–	68
3	5	–	–	5	–	–	92	30	64	43	4	–	17	4	–	–	–	–	–	69
173	137	19	–	16	–	102	1,298	309	989	370	4	–	549	60	6	–	–	4	6	70
312	131	20	–	21	7	83	1,205	214	778	392	2	–	336	39	9	–	–	–	–	71
19	12	2	–	–	–	10	330	119	211	73	–	–	135	1	2	–	–	–	–	72
9	7	2	–	2	–	3	58	18	40	20	2	–	18	–	–	–	–	–	–	73
6	5	–	–	1	1	3	59	21	38	23	–	–	15	–	–	–	–	–	–	74
150	121	31	–	7	–	83	803	190	613	325	1	–	270	7	10	–	–	4	4	75
–	–	–	–	–	–	–	48	13	35	22	–	–	9	–	–	–	–	1	1	76
15	18	1	–	2	–	15	109	22	87	35	–	–	48	2	2	–	–	2	2	77
230	217	27	9	53	–	128	2,037	634	1,403	636	2	–	671	89	5	–	–	6	5	78
18	18	4	–	2	–	12	215	145	70	19	2	–	33	10	6	–	–	–	–	79
6,348	5,073	1,196	22	428	36	3,354	64,118	20,145	43,819	13,587	169	48	25,755	2,583	768	125	112	189	161	
81	89	31	–	18	–	40	1,422	584	838	80	–	–	704	54	–	67	49	3	3	80
2	2	–	1	–	–	2	130	37	93	7	–	–	86	–	–	–	–	–	–	81
37	44	10	–	4	–	30	599	162	437	59	–	–	276	103	1	12	10	–	–	82
69	61	30	2	11	1	17	1,325	301	1,018	93	1	–	479	408	–	31	24	6	3	83
15	3	2	–	1	–	2	131	114	117	35	–	–	82	–	–	–	–	–	–	84
469	386	182	9	37	1	177	4,610	1,939	2,671	594	7	–	1,894	163	10	6	6	–	–	85
114	100	21	–	15	–	64	2,302	1,197	1,105	526	2	2	457	113	5	–	–	–	–	86
50	50	30	–	–	–	20	382	114	268	56	–	–	210	5	1	–	–	–	–	87
119	74	25	–	1	–	48	1,060	511	549	166	5	–	276	101	1	–	–	–	–	88
65	48	21	4	5	–	18	829	246	583	140	1	–	323	100	2	12	7	3	3	89
13	12	5	–	1	–	6	228	30	198	44	1	–	94	58	1	–	–	–	–	90
2	2	–	1	1	1	2	83	27	3	1	–	–	52	–	–	–	–	–	–	91
31	19	8	–	–	–	11	468	163	305	41	–	–	197	67	–	–	–	5	5	92
1,067	890	365	17	94	3	437	14,369	5,425	8,185	1,842	17	2	5,128	1,172	21	128	96	17	14	
6,348	5,073	1,196	22	428	36	3,354	64,118	20,145	43,819	13,587	169	48	25,755	2,583	768	125	112	189	161	
7,410	5,963	1,561	39	522	39	3,791	78,487	25,570	52,004	15,429	186	50	30,883	3,755	769	253	208	206	175	

Sandwich, and Chard, have furnished no Returns of Crime.

POLICE (COUNTIES AND BOROUGHS).

REPORTS of the INSPECTORS OF CONSTABULARY for the Year ended 29th September 1865, made to Her Majesty's Principal Secretary of State, under the Provisions of the Statute 19 & 20 Vict. c. 69.

(*Presented pursuant to Act of Parliament.*)

Ordered, by The House of Commons, *to be Printed,*
17 *February* 1866.

[*Price* 1 *s.* 10 *d.*]

54.

Under 20 *oz.*

POLICE (SCOTLAND).

EIGHTH REPORT

OF

HER MAJESTY'S INSPECTOR OF CONSTABULARY OF SCOTLAND;

For the Year ended 15th March 1866.

(PRESENTED PURSUANT TO ACT OF PARLIAMENT.)

Ordered, by The House of Commons, *to be Printed,*
4 *June* 1866.

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EIGHTH REPORT of Colonel *John Kinloch*, Her Majesty's Inspector of the Constabulary of *Scotland*, for the year ending 15th March 1866.

GENERAL REPORT.

To the Right Honourable Sir *George Grey*, Bart., G.C.B., M.P., Her Majesty's Principal Secretary of State for the Home Department.

Sir, Logie, Kirriemuir, N. B., 25 April 1866.

I HAVE the honour to lay before you this, my Eighth Report, on the state and efficiency of the Police Forces of the counties and burghs in Scotland.

Police stations.

There is still great improvement required in many of the police stations and lockups in counties and burghs; and, in both, houses or lodgings are much wanted for the officers, serjeants, and constables and their families to reside in.

The want of such stations prevents many good men from remaining in the police service, and many from entering it at all. Many of the lockups are unfit for the detention of prisoners, particularly in cold and damp weather, being totally unprovided with any means for drying or warming them.

The burgh of Dingwall, in Ross-shire, has united with the county for police purposes, in terms of the 61st section of the Act.

The burgh of Stranraer, having extended the bounds of the royalty so as to include the parliamentary burgh, now numbers upwards of 5,000 inhabitants; and having reorganised its police force, I am enabled to report it efficient in numbers.

Dumfries is the only burgh with a population exceeding 5,000 inhabitants that continues to be inefficient both in numbers and discipline.

Resignations and dismissals.

The number of resignations, desertions, and dismissals from police forces is greater than in any previous year. This is very easily accounted for. Men with the qualifications necessary for the police service,—in the prime of life, of good character, with a good education, with tact, temper, and general intelligence,—can now obtain better remuneration in many other professions or trades, on easier terms, with a less number of hours' work or duty, and subjected to less discipline, besides having their Saturday evenings and Sundays to themselves, which are the busiest times of the week for the police.

Many avoid entering this service, or having entered it are so soon dissatisfied with the remuneration given for the amount of duty required of them, the prospect of promotion being so distant, and there being no superannuation or retiring allowance to look forward to, after spending the best part of their lives in it, that they resign, or even desert, rather than serve the short time usually required for warning, or become so careless and indifferent in the execution of their duties, that their chief officers are obliged to dismiss them.

In addition to the better pay of many trades and professions in the present prosperous state of the country, emigration presents many attractions, either to our

our own colonies or to America, to men possessed of the qualifications above mentioned. Added to these, it is well known throughout Scotland that the pay of the Metropolitan and City of London police forces (upwards of 8,000 men), and those of some of the larger cities and boroughs in England, is considerably higher than in Scotland, and that the rate of pay in the English counties has also lately been raised, and in some of these forces there is a superannuation and retiring fund on a liberal scale after a certain number of years' service.

The time appears now to have arrived when the subject of readjusting the pay of the police force in Scotland should be immediately taken into consideration by the Government, and also by the local authorities of counties and burghs, or the present standard of the police cannot much longer be maintained, but, on the contrary, is likely to be deteriorated, and the efficiency of the force generally impaired.

To remedy this, an addition should be made to the present minimum pay of the lowest class, and more rapid and certain promotion should be open to the higher paid classes and grades, after having proved themselves qualified by a limited period of good-conduct service. This has already been done in some of the principal forces, both of counties and burghs, and the limit previously fixed for the number of those in the higher classes has been removed, so that a constable is not required to wait for a vacancy after he has proved himself duly qualified for a higher step.

I have already recommended that good stations or lodgings should be provided for constables and their families, at a moderate rent; and this would be equal in value to a rise of pay, whilst it would not add to the burden on the ratepayers, as the rents would be paid by those who occupy them.

erannuation
d.

But a superannuation fund, with a retiring allowance after certain periods of service, as in the Metropolitan, City of London, and other police forces, and in other branches of the Civil Service, is the boon that is most desired; and I find that a general feeling of disappointment exists in all ranks of the police forces in this country from there being no such fund already established on a sound and practical footing.

It is well known that educated and intelligent Scotchmen, with good characters and recommendations, are cordially welcomed and received into the police forces in England, where their prospects are brighter than in the same service in their own country.

A superannuation fund has been established in the Greenock police force, but it is on rather too limited a scale to be of much benefit or temptation to members of the force to continue in it on that account.

In Kincardineshire, the lives of the constables have been insured up to a certain age; half of the annual premiums are paid by themselves, and the rest by the county.

serve force.

The more numerous changes reported by resignations, dismissals, and desertions, prove the necessity of having a reserve force of a few constables at head-quarters to be trained to their duties, before taking charge of a beat or station; and this is much more necessary in county police forces than in burghs, as they are out of sight, and frequently out of reach, of any of their officers or serjeants, or even any of their more experienced comrades, to whom to apply for advice or assistance when required.

Two reserve constables have been authorised to be appointed in Roxburghshire, and one has been added in Berwickshire, and one in East Lothian.

lmon-fishing
tection.

The illegal destruction of salmon in contravention of the "Tweed Acts," continues to be carried on to a considerable extent in the counties of Berwick, Peebles,

Peebles, Roxburgh, and Selkirk, on the river Tweed and its tributaries; but the number of convictions, and the amount of fines and expenses, are less during last year than the one before.

The limited number of men for the great extent of rivers to be watched has made it impossible as yet to protect the fishing completely; but it is expected that the appointment of permanent constables in the above-mentioned counties may prove more effectual than the watchers or bailiffs formerly employed temporarily during the close season, although it will be necessary to employ some of the latter under the permanent constables.

The following is a return of the convictions, and amount of fines of prosecution, for salmon poaching, during the last year:—

Counties.	Convictions.	Fines and Expenses.
		£. s. d.
Berwickshire	22	51 9 9
Peebles-shire	47	210 8 11
Roxburghshire	39	111 16 –
Selkirkshire	21	53 16 –
Total	129	£.427 10 8
1864–65	199	£.605 10 –
Decrease 1865–66	70	£.177 19 4

Cattle plague.

The constabulary of many counties in Scotland have been very actively employed in carrying out the Cattle Plague Act, Orders in Council, Regulations of the justices of peace and local authorities.

The rural police was the only available machinery for this purpose, and might, with great benefit, have been taken advantage of at an earlier period, immediately on the appearance of the disease or even before, when it was too well known to be gradually but certainly approaching.

In some counties, particularly in the north, extra constables were employed temporarily to assist the regular police force; and in Aberdeenshire there were upwards of 40 extra men engaged to form an agricultural police cordon along the River Dee, and parts adjoining other counties.

In some cases chief constables had difficulty in getting suitable men when required, owing to the remuneration for their services having been fixed so low. As they were only engaged temporarily, by the week, and trustworthy, intelligent men were required for a most important and responsible duty, a more liberal remuneration might have been justly and wisely offered.

Chief constables as procurators fiscal.

In some counties in Scotland the chief constables are employed as procurators fiscal to the justices of the peace in statutory offences.

This system began some years ago by their being so employed in cases of contravention of "Turnpike and Statute Labour Road Acts."

Now they are required to prosecute in the numerous other cases under the "Weights and Measures," and "Public-houses" Acts, "Salmon Fishing," and "Poaching Prevention" Acts, and, in the counties of Edinburgh and Ross, under the Acts, Orders in Council, Regulations of justices of peace and local authorities, with regard to the Cattle Plague.

These

These duties take up a great deal of the chief constables' time that might be more properly devoted to their police duties. Much time is occupied in preparing these cases, besides conducting them in court; and some of them require a considerable amount of practical knowledge of the criminal law and mode of procedure in this country. The last-mentioned Acts are comparatively new, and therefore require much tact, judgment, and skill in prosecuting cases under them, and they are liable to make the police extremely unpopular.

It is the duty of the police to endeavour to prevent, or to detect and report all such cases, but to make them the prosecutors as well as reporters is a matter deserving consideration. In large counties, such as Fife, Perth, and Ross, the numerous police duties devolving upon the chief constables are sufficient, without their being required to prosecute statutory cases before justices of peace in many different and sometimes distant parts of their counties. In Ross-shire the chief constable acts as procurator at Ullapool, Jeantown, Gairloch, and Lochalsh, at distances of from 45 to 64 miles from head-quarters at Dingwall.

The counties of Aberdeen, Ayr, Forfar, Peebles, and Renfrew do not allow their chief constables to act as procurators fiscal, as in the counties before mentioned.

In small counties, where the time of the chief constables is not in general so fully occupied, their acting as procurators is not, perhaps, so objectionable as in the larger counties, but the propriety and principle of their being so employed is worthy of consideration.

The superintendents of police of some of the burghs act as procurators fiscal in the police courts.

grancy.

By the annexed return of cases of vagrancy reported by the police, there were 2,093 less than the year before, but 1,275 more children. In 12 counties there was an increase, and in 19 a decrease.

The Act 28 & 29 Vict. c. 56, "To provide for the Better Prevention of Trespass in Scotland," commonly called the "Trespass Act," passed last Session, and has not yet been a year in operation. On the whole it has proved a benefit, so far as it goes, and where it was actively put in force; but it merely gives the police power to prevent vagrants from lodging in any premises "without the consent of the owners," and from "encamping or lighting fires on roads, in woods, or on enclosed and cultivated land."

This applies almost entirely to the class of vagrants called "gipsies," "tinkers," or "muggers," who formerly could not be interfered with by the police.

The objects of the Act, and the endeavours of the police to carry out its provisions, are much impeded and rendered nugatory by persons in the country (generally the families of farmers and cottagers, and their servants), giving permission to the above-mentioned vagrants and unlicensed petty hawkers to lodge in their barns, byres, stables, and outhouses,—considering it charity to do so, and particularly to the women and numerous children who generally accompany the men.

This mistaken charity, however, is, in many cases, most ungratefully acknowledged and rewarded, as these wandering tribes are frequently suffering from infectious diseases, and there is no doubt that the "Rinderpest" or "Cattle Plague" has been in some cases conveyed by them from affected to unaffected places, in spite of Orders in Council, justices of peace, and "local authorities."

The following letter, signed "An Inspector of Poor," lately appeared in the "Scotsman" newspaper, and gives but too true an account of the evils of vagrancy that prevail at the present day in Scotland.

" *Vagrant*

"*Vagrant Propagators of Plague.*

"In taking precautions against the extension of the cattle plague, the authorities seem to have overlooked the numerous houseless vagrants who wander from farm to farm, sleeping generally in outhouses, often byres, or places adjoining byres. Not long ago I saw at a highland farm steading a bed in one of the cow-stalls, to which beggars in general were made welcome; and in a case in my own parish I found that a farmer had lodged a sick vagrant in an outhouse where calves were kept. I understand, however, from information furnished by beggars themselves, that they commonly sleep in the barn among the straw, afterwards served out to the cattle for food and litter. In these circumstances, it is only to be expected that vagrants should be one of the means of spreading contagion. In my own experience they have, at various times, introduced fever and small-pox into the parish in which I reside. In the summer of 1863, the last-named disease was prevalent in this district, and was the cause of death or disfigurement to many, both of the old and the young. Its introduction could clearly be traced to some beggars to whom a farmer had given lodgings. As they are the means of conveying over the country the diseases which affect the human race, it is at least probable that vagrants are also the means of spreading the cattle plague. At all events, the subject is worthy of attention.

"I am, &c.,
(signed) "AN INSPECTOR OF POOR."

Vagrants are encouraged in some burghs, by being allowed to demand and obtain lodgings in police stations, offices, and cells, and are the means of infecting them with diseases, as well as the members of the police force, whose duties require them to be in attendance, and to clean out these places after the departure of their dirty occupants.

The "Trespass Act" is reported to have worked beneficially in the counties of Aberdeen, Banff, Elgin, Inverness, Nairn, and Sutherlandshire, in the north. In the latter, several tribes of tinkers who used to infest that county are believed to have emigrated to America. No notice of the Act has been taken in Ross-shire, where there appears to have been an increase of 329 vagrants during last year. In the south, in the counties of Berwick, Dumfries, Haddington, Kirkcudbright, Peebles, Selkirk, and Wigtown, the "Trespass Act" has been found to work beneficially on its first year's trial. The central counties of Scotland do not appear to be so much troubled with "tinkers" and vagrants of that description as those in the north and south.

The "Trespass Act" has had the effect in some counties of forcing tinkers and other vagrants to lodge in country villages (now that they are prohibited from encamping as formerly), where they are looked upon with suspicion, and as troublesome neighbours. The Act may probably have a good effect on the children, prevent their acquiring the confirmed and generally incurable habit of leading a vagabond life, and enable them to receive some education, and thus to become, in a certain degree, more civilized than their parents.

The number of cases of juvenile vagrancy (13,538 children) amounts to upwards of 23½ per cent. of the total number (57,161) reported during last year.

The actual number of persons included in the cases of vagrancy will probably amount to about one-third, or upwards of 19,000.

Weights and measures.

The inspection of the weights and measures has now been placed under the constabulary of most counties in Scotland, and gives general satisfaction to the public.

Police Gazette.

A "Police Gazette," for the information of the police and all persons employed in the prevention and detection of crime in Scotland, would be not only of great use to them, but also of advantage to the public service.

The number of officers and constables in counties amounts to 982 (being 16 more than the year before), or one to 1,861 inhabitants: in burghs to 1,798 (being 61 more than the year before), or one to 655: Total, 2,780; or 1 to 1,078, according to the Census of 1861, excluding the county of Orkney and Shetland.

I have, &c.
(signed) *John Kinloch.*

LIST of BURGHS that have United with their respective Counties, in Terms of the 61st Section of the Act 20 & 21 Vict. c. 72.

No.	BURGH.	COUNTY.	Population in 1861.	REMARKS.
1	Burntisland - - -	Fife - - -	3,146	Royal Burgh.
2	Campbeltown - -	Argyle - - -	6,042	- ditto.
3	Cupar - - - -	Fife - - -	5,029	- ditto.
4	Dingwall - - -	Ross - - -	2,084	- ditto.
5	Dysart - - - -	Fife - - -	8,067	- ditto.
6	Jedburgh - - -	Roxburgh - -	3,429	- ditto.
7	Lanark - - - -	Lanark - - -	5,384	- ditto.
8	Kirkcaldy - - -	Fife - - -	10,851	- ditto.
9	Maybole - - -	Ayr - - -	4,114	Burgh of Barony.
10	Musselburgh - - -	Edinburgh - -	7,422	Royal Burgh.
11	Port Glasgow - -	Renfrew - - -	7,214	- ditto.
12	Portobello - - -	Edinburgh - -	4,366	Burgh of Barony.
13	Rutherglen - - -	Lanark - - -	8,474	Royal Burgh.
14	St. Andrews - - -	Fife - - -	5,176	- ditto.
15	Wishaw - -	Lanark - - -	7,567	Burgh by adoption of Police Act.

LIST of BURGHS that have Merged into their respective Counties, and been formed into separate Police Districts, in Terms of the 58th Section of the Statute.

No.	BURGH.	COUNTY.	Population in 1861.	REMARKS.
1	Dunfermline* - -	Fife - - -	5,103	Parliamentary Burgh.
2	Peterhead - - -	Aberdeen - -	7,519	Royal Burgh.
3	Thurso - - - -	Caithness - -	2,400	Burgh of Barony.

* The Royal Burgh of Dunfermline maintains a police of its own.

CITIES and BURGHS reported Efficient, above 5,000 Inhabitants.

No.	CITIES AND BURGHS.	COUNTIES.	Population in 1861.	No.	CITIES AND BURGHS.	COUNTIES.	Population in 1861.
1	Aberdeen	Aberdeen	62,000	16	Greenock	Renfrew	42,100
2	Airdrie	Lanark	12,918	17	Hamilton	Lanark	10,686
3	Alloa	Clackmannan	6,440	18	Hawick	Roxburgh	10,684
4	Arbroath	Forfar	17,657	19	Inverness	Inverness	12,499
5	Ayr	Ayr	8,210	20	Johnstone	Renfrew	7,007
6	Brechin	Forfar	7,180	21	Kilmarnock	Ayr	20,698
7	Dumbarton	Dumbarton	8,253	22	Kirkintilloch	Dumbarton	7,486
8	Dundee	Forfar	90,425	23	Leith	Edinburgh	33,628
9	Dunfermline	Fife	8,401	24	Maryhill	Lanark	5,225
10	Edinburgh	Edinburgh	168,098	25	Montrose	Forfar	14,563
11	Elgin	Elgin	7,543	26	Paisley	Renfrew	47,419
12	Forfar	Forfar	9,258	27	Partick	Lanark	10,917
13	Galashiels	Selkirk	6,424	28	Perth	Perth	23,000
14	Glasgow	Lanark	403,276	29	Rothesay	Bute	7,122
15	Govan	ditto	12,092	30	Stirling	Stirling	13,714
				31	Stranraer	Wigtown	6,274

BURGHS reported Efficient, under 5,000 Inhabitants.

No.	BURGHS.	COUNTY.	Population in 1861.
1	Banff	Banff	3,939
2	Dunbar	Haddington	3,796
3	Forres	Elgin	3,508
4	Helensburgh	Dumbarton	4,749
5	Renfrew	Renfrew	3,731

BURGHS reported Inefficient, above 5,000 Inhabitants.

No.	BURGHS.	COUNTY.	Population in 1861.
1	Dumfries	Dumfries	10,440

BURGHS reported Inefficient, under 5,000 Inhabitants.

No.	BURGH.	COUNTY.	Population in 1861.
1	Annan - - - -	Dumfries - -	3,473
2	Ardrossan - - -	Ayr - - - -	2,951
3	Blairgowrie - - -	Perth - - -	3,600
4	Cromarty - - -	Cromarty - - -	1,491
5	Fraserburgh - -	Aberdeen - - -	3,130
6	Haddington - - -	Haddington - - -	3,897
7	Kelso - - - -	Roxburgh - - -	4,309
8	Kirriemuir - -	Forfar - - - -	3,425
9	Macduff - - -	Banff - - - -	3,067
10	Maxwelltown - -	Kirkcudbright - -	3,646
11	Nairn - - - -	Nairn - - - -	3,437
12	Newburgh - -	Fife - - - -	2,300
13	Pulteneytown - -	Caithness - - -	5,000
14	Wick - - - -	Caithness - - -	2,000

RETURN of Vagrants, Tinkers, and Unlicensed Hawkers, reported by the Constabulary in their respective Counties during last Year, to 15th March 1866.

COUNTIES.	Number.	Increase	Decrease	Children.	REMARKS.
		Since last Year.			
1. Aberdeen - -	1,770	- -	589	647	
2. Argyle - -	1,763	- -	250	784	
3. Ayr - - -	12,321	- -	157	1,218	
4. Banff - - -	530	- -	15	217	
5. Berwick - -	745	- -	466	240	
6. Bute - - -	38	2	- -	7	
7. Caithness - -	533	- -	87	- -	No return of children.
8. Clackmannan -	678	228	- -	301	
9. Cromarty - -	- -	- -	- -	- -	No police force.
10. Dumbarton - -	1,639	- -	371	457	
11. Dumfries - -	6,670	1,047	- -	2,035	
12. Edinburgh - -	1,606	324	- -	475	
13. Elgin or Moray -	824	- -	412	266	
14. Fife - - -	3,398	1,481	- -	756	
15. Forfar - - -	1,758	- -	509	300	
16. Haddington - -	1,318	117	- -	133	
17. Inverness - -	921	- -	483	384	
18. Kincardine - -	621	59	- -	245	
19. Kinross - -	398	52	- -	93	
20. Kirkcudbright -	4,132	- -	751	807	
21. Lanark - - -	2,883	- -	660	665	
22. Linlithgow - -	869	- -	1	168	
23. Nairn - - -	236	- -	54	76	
24. Peebles - -	285	- -	173	80	
25. Perth - - -	4,328	- -	366	1,689	
26. Renfrew - -	1,333	- -	633	283	
27. Ross - - -	573	329	- -	132	
28. Roxburgh - -	1,275	- -	90	81	
29. Selkirk - -	1,421	872	- -	573	
30. Stirling - -	1,421	196	- -	219	
31. Sutherland - -	344	18	- -	109	
32. Wigton -	530	- -	751	107	
TOTAL - - -	57,161	4,725	6,818	13,538	
Decrease since last Year - -		- -	2,093		

Appendix (A.)

RATE of PAY of OFFICERS, SERJEANTS, and CONSTABLES in the COUNTY POLICE FORCES in *Scotland.*

COUNTIES.	Population in 1861.	Area in Square Acres.	Strength of Police Force.	Population to One Constable.	Officers, Serjeants, and Constables.						Pay of Officers per Annum.			Pay of Constables per Week.								REMARKS.
															Serjeants.		Constables.					
					Chief Constable.	Superin-tendent.	Inspector.	Detectives.	Serjeants.	Constables.	Chief Constable.	Superin-tendent.	Inspector.	Detectives.	1st Class.	2d Class.	1st Class.	2d Class.	3d Class.	4th Class.	5th Class.	
											£.	£. s.	£. s.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s.	
1. Aberdeen	156,439	1,270,740	69	2,267	1	1	7	–	6	54	[1] 300	130 –	75 – 65 –	–	23 –	21 –	19 –	17 6	16 –	14	–	[1] And 50 *l.* for travelling expenses.
2. Argyle	79,724	2,083,126	44	1,812	1	2	2	1	3	35	[1] 200	91 – 73 –	65 –	21 –	21 –	–	18 8	16 11	15 2	–	–	[1] And horse and travelling expenses.
3. Ayr	167,103	650,156	87	1,920	1	2	4	4	10	66	[1] 300	[2] 115 –	70 –	21 –	24 6	22 6	21 –	19 6	18 –	17	–	[1] And 50 *l.* for travelling expenses; [2] and 40*l.* for a horse.
4. Banff	52,149	439,219	17	3,067	1	1	–	–	2	13	[1] 200	80 –	–	–	21 –	–	17 –	16 –	15 –	–	–	[1] And 50 *l.* for horse and travelling expenses.
5. Berwick	36,613	309,375	23	1,592	1	1	–	–	4	17	[1] 250	65 –	–	–	23 –	–	20 –	18 6	17 –	–	–	[1] Including 50 *l.* for horse and travelling.
6. Bute	9,209	109,375	7	1,315	1	–	–	–	1	5	105	–	–	–	21 –	–	19 6	18 6	17 6	–	–	—
7. Caithness	35,000	455,708	15	2,333	1	–	–	–	3	11	[1] 200	–	–	–	23 10½	[2] 21 –	18 –	16 3	15 –	–	–	[1] Including keep of a horse; [2] and 30*l.* for a horse.
8. Clackmannan	15,010	29,744	7	2,144	1	1	–	–	–	6	[1] 40	120 –	–	–	–	–	18 –	17 –	–	–	–	[1] And 5 *l.* for travelling expenses.
9. Cromarty	2,267	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No police force.
10. Dumbarton	31,566	189,844	22	1,435	1	1	–	–	3	17	[1] 200	80 –	–	–	25 –	23 –	19 –	17 6	16 –	–	–	[1] And travelling expenses.
11. Dumfries	61,983	722,813	32	1,936	1	1	1	1	4	24	[1] 390	[2] 100 –	[2] 65 –	[2] 21 –	[2] 22 6	[2] 21 –	[2] 18 –	[2] 17 –	–	–	–	[1] Including keep of horse and travelling expenses; [2] and free houses or lodging money.
12. Edinburgh	72,248	254,300	47	1,537	1	1	4	–	4	37	[1] 400	100 –	75 –	–	23 –	22 –	21 –	20 –	18 –	17	–	[1] Including 50 *l.* for a horse.
13. Elgin or Moray	31,644	340,000	13	2,433	1	–	–	–	2	10	[1] 200	–	–	–	21 –	–	19 –	17 –	16 –	–	–	[1] And 10 *l.* for travelling expenses.
14. Fife	144,070	322,031	58	2,483	1	1	4	1	3	48	[1] 300	91 –	70 4	22 –	22 –	–	19 –	17 6	16 –	–	–	[1] Including 50 *l.* for travelling expenses.
15. Forfar	61,917	568,750	32	1,935	1	2	2	–	3	24	[1] 300	90 – 80 –	70 –	–	23 –	–	20 6	19 6	18 –	16 6	–	[1] Including 50 *l.* for a horse.
16. Haddington	29,941	185,937	26	1,151	1	1	–	1	3	20	[1] 250	80 –	–	23 –	23 –	–	20 –	18 6	17 –	–	–	[1] Including travelling expenses.
17. Inverness	76,389	2,723,501	37	2,064	1	1	3	–	2	30	[1] 250	70 –	60 –	–	21 –	–	21 –	19 6	18 –	–	–	[1] And travelling expenses.
18. Kincardine	34,466	252,250	15	2,297	1	–	–	–	3	11	150	–	–	–	22 –	21 –	19 –	17 –	16 –	–	–	—
19. Kinross	7,977	49,531	5	1,595	1	1	–	–	–	4	[1] 30	[2] 70 –	–	–	–	–	18 –	17 –	–	–	–	[1] And 5*l.* travelling expenses; [2] and free house.
20. Kirkcudbright	38,849	610,734	18	2,158	1	1	–	–	1	15	[1] 225	[2] 75 –	–	–	[2] 21 –	–	[2] 20 –	[2] 18 –	[2] 16 –	–	–	[1] Including horse-keep; [2] and free houses.
21. Lanark	176,452	593,680	149	1,184	1	5	6	–	18	119	[1] 400	[1] 190 –	80 – 75 8	–	24 –	–	21 –	19 –	18 –	–	–	[1] Including keep of a horse.
22. Linlithgow	38,645	64,375	20	1,932	1	1	–	–	2	16	[1] 185	67 12	–	–	23 –	–	20 –	18 6	17 –	–	–	[1] Including 30 *l.* for a horse.
23. Nairn	6,628	137,500	4	1,657	1	–	–	–	–	3	100	–	–	–	–	–	–	–	15 –	–	–	—
24. Peebles	11,408	226,488	8	1,426	1	–	–	–	1	6	100	–	–	–	–	–	18 –	–	–	–	–	—
25. Perth	106,900	1,814,063	55	1,943	1	1	2	2	8	41	[1] 250	80 –	71 10 67 12	22 –	24 –	22 6 20 –	18 6	17 –	16 –	–	–	[1] And 40 *l.* for travelling expenses.
26. Renfrew	77,304	150,000	40	1,932	1	1	4	–	7	27	250	78 –	72 16	–	22 –	–	20 –	18 –	16 –	–	–	—
27. Ross	77,648	2,016,375	28	2,773	1	2	1	–	2	22	[1] 250	75 – 65 –	60 –	–	20 –	–	17 –	16 –	15 –	–	–	[1] And 30 *l.* for keep of a horse.
28. Roxburgh	39,114	460,938	34	1,150	1	1	–	–	5	27	[1] 300	100 –	–	–	[2] 22 –	–	[2] 20 –	[2] 19 –	[2] 17 –	[2] 16 –	–	[1] Including keep of a horse.
29. Selkirk	7,449	170,313	9	827	1	–	–	–	1	7	[1] 105	–	–	–	[2] 22 –	–	[2] 18 –	–	–	–	–	[1] Exclusive of horse-keep; [2] and free houses.
30. Stirling	78,212	295,875	35	2,120	1	2	–	–	5	27	[1] 200	90 –	–	–	23 –	–	19 6	18 –	17 –	–	–	[1] And travelling expenses.
31. Sutherland	25,246	1,207,188	9	2,805	1	–	–	–	1	7	[1] 200	–	–	–	20 –	–	18 –	16 6	–	–	–	[1] Including travelling expenses.
32. Wigton	38,115	327,815	16	2,382	1	1	–	–	1	13	[1] 175	[2] 65 –	–	–	[2] 22 –	–	[2] 20 –	[2] 17 –	–	–	–	[1] And 25 *l.* for travelling expenses.
				1 constable between Aberdeenshire and Banffshire.																		
TOTAL	1,827,685	–	982	1,861																		

John Kinloch.

Appendix (B.)

Rate of Pay of Officers, Serjeants, and Constables in the Burgh Police Forces in *Scotland*.

No.	Burghs.	County.	Population in 1861.	Strength of Police Force.	Population to One Constable.	Officers and Constables.							Pay of Officers per Annum.				Pay of Constables per Week.								Remarks.
						Chief Constables.	Superintendents.	Lieutenants.	Inspectors.	Detectives.	Serjeants.	Constables.	Chief Constable.	Superintendents.	Lieutenants.	Inspectors.	Detectives.	Serjeants. 1st Class.	Serjeants. 2d Class.	Constables. 1st Class.	Constables. 2d Class.	Constables. 3d Class.	Constables. 4th Class.	Constables. 5th Class.	
													£.	£. s. d.	£. s.	£. s.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
1	Aberdeen	Aberdeen	62,000	88	704	–	1	2	–	2	7	76	–	210 – –	85 – 75 –	–	24 –	23 –	21 –	19 –	17 6	16 –	–	–	
2	Airdrie	Lanark	12,918	11	1,174	–	1	–	1	1	1	7	–	140 – –	–	62 8	–	21 –	–	18 6	17 –	16 –	–	–	
3	Alloa	Clackmannan	6,440	4	1,610	–	1	–	–	–	–	3	–	[1] 52 – –	–	–	–	–	–	–	[2] 15 –	–	–	–	[1] And free houses, coals, and gas.
4	Annan	Dumfries	3,473	2	1,736	–	1	–	–	–	–	1	–	52 – –	–	–	–	–	–	17 6	–	–	–	–	
5	Arbroath	Forfar	17,657	15	1,177	–	1	–	–	–	3	11	–	130 – –	–	–	–	23 6	22 6	19 6	18 6	16 6	–	–	
6	Ardrossan	Ayr	2,951	1	2,951	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	
7	Ayr	Ayr	8,219	10	821	–	1	–	–	–	2	7	–	90 – –	–	–	–	21 –	–	17 6	16 6	–	–	–	
8	Banff	Banff	3,939	3	1,313	–	1	–	–	–	–	2	–	75 18 6	–	–	–	–	–	–	–	15 –	–	–	
9	Blairgowrie	Perth	3,600	1	3,600	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	15 –	–	–	
10	Brechin	Forfar	7,180	6	1,196	–	1	–	–	–	1	4	–	75 – –	–	–	–	19 –	–	17 –	16 –	–	–	–	
11	Cromarty	Cromarty	1,491	1	1,491	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	13 –	–	–	
12	Dumbarton	Dumbarton	8,253	7	1,179	–	1	–	–	–	1	5	–	110 – –	–	–	–	22 –	–	19 –	17 6	16 –	–	–	
13	Dumfries	Dumfries	10,440	7	1,491	–	1	–	–	–	1	5	–	100 – –	–	–	–	21 –	–	–	–	16 6	–	–	
14	Dunbar	Haddington	3,796	3	1,265	–	1	–	–	–	–	2	–	[1] 65 – –	–	–	–	–	–	18 –	–	–	–	–	[1] And free house and gas.
15	Dundee	Forfar	90,425	116	779	–	1	2	4	2	8	99	–	[1] 325 – –	115 – 85 –	78 – 73 –	25 –	24 –	23 –	20 –	18 6	17 –	–	–	[1] And free house.
16	Dunfermline	Fife	8,401	6	1,401	–	1	–	–	–	–	5	–	100 – –	–	–	–	–	–	18 –	–	–	–	–	
17	Edinburgh	Edinburgh	168,098	351	478	–	1	4	3	10	30	[2] 303	–	[1] 400 – –	[1] 165 – [1] 110 –	150 – [1] 110 – [1] 91 –	36 – 34 – 29 –	26 –	23 –	21 –	20 –	18 –	16 –	13 –	[1] And free houses. [2] Including 12 assistant constables at 7*s.* per week.
18	Elgin	Elgin	7,543	6	1,257	–	1	–	–	–	1	4	–	75 – –	–	–	–	20 –	–	18 –	16 –	–	–	–	
19	Forfar	Forfar	9,258	6	1,543	–	1	–	–	–	1	4	–	100 – –	–	–	–	20 6	–	18 –	16 –	–	–	–	
20	Forres	Elgin	3,508	2	1,754	–	1	–	–	–	–	1	–	48 – –	–	–	–	–	–	–	15 6	–	–	–	
21	Fraserburgh	Aberdeen	3,130	2	1,565	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	15 –	–	–	–	

22	Galashiels -	Selkirk -	6,944	6	1,157	–	1	–	–	–	1	4	–	90 – –	–	–	–	21 6	–	18 6	17 6	–	–	–	
23	Glasgow -	Lanark -	403,276	751	537	1	6	19	23	23	48	631	600	240 – – 140 – –	100 – 70 –	110 – 78 –	30 23	25 – 24 –	23 –	21 –	20 –	18 –	16 –	–	
24	Govan -	Lanark -	12,092	14	864	–	1	–	1	–	1	11	–	140 – –	–	70 4	–	24 –	–	20 –	19 –	18 –	–	–	
25	Greenock -	Renfrew -	42,100	100	421	–	1	4	2	3	9	81	–	250 – –	95 – 80 –	72 –	28 25	24 –	23 –	21 –	20 –	18 –	17 –	14 –	
26	Haddington -	Haddington -	3,897	2	1,948	–	1	–	–	–	–	1	–	75 – –	–	–	–	–	–	[1] 16 6	–	–	–	–	[1] And free house.
27	Hamilton -	Lanark -	10,686	9	1,187	–	1	–	–	–	2	6	–	100 – –	–	–	–	21 6	–	18 6	16 6	–	–	–	
28	Hawick -	Roxburgh -	10,684	9	1,187	–	1	–	–	–	2	6	–	130 – –	–	–	–	22 6	20 6	18 6	17 6	–	–	–	
29	Helensburgh -	Dumbarton -	4,749	8	593	–	1	–	–	–	1	6	–	100 – –	–	–	–	20 –	–	18 –	17 –	16 –	–	–	
30	Inverness -	Inverness -	12,499	16	781	–	1	–	–	–	3	12	–	[1] 100 – –	–	–	–	21 –	20 –	18 –	16 –	–	–	–	[1] And free house.
31	Johnstone -	Renfrew -	7,007	6	1,168	–	1	–	–	–	1	4	–	80 – –	–	–	–	22 6	–	20 –	19 –	18 –	–	–	
32	Kelso -	Roxburgh -	4,309	3	1,436	–	1	–	–	–	–	2	–	62 – –	–	–	–	–	–	[1] 16 –	–	–	–	–	[1] And 5 *l.* for house-rent.
33	Kilmarnock -	Ayr -	20,698	18	1,150	–	1	–	1	–	3	13	–	145 – –	–	[1] 63 14	–	[1] 24 –	[1] 22	[1] 21 –	[1] 20 –	[1] 18 –	[1] 16 –	–	[1] And 1 *l.* each boot money.
34	Kirkintilloch -	Dumbarton -	7,486	4	1,871	–	1	–	–	–	1	2	–	71 6 –	–	–	–	21 6	–	18 6	17 6	–	–	–	
35	Kirriemuir -	Forfar -	3,425	1	3,425	–	–	–	–	–	–	–	–	52 – –	–	–	–	–	–	–	–	–	–	–	
36	Leith -	Edinburgh -	33,628	61	551	–	1	–	1	3	7	49	–	250 – –	–	85 –	30	23 –	–	20 –	18 –	17 –	–	–	
37	Macduff -	Banff -	3,067	1	3,067	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	15 –	–	–	
38	Maryhill -	Lanark -	5,225	6	871	–	1	–	–	–	1	4	–	140 – –	–	–	–	22 –	–	19 –	17 6	–	–	–	
39	Maxwelltown -	Kirkcudbright	3,646	2	1,823	–	1	–	–	–	–	1	–	[1] 54 12 –	–	–	–	–	–	–	16 –	–	–	–	[1] And free house, coals and gas.
40	Montrose -	Forfar -	14,563	15	970	–	1	–	–	–	3	11	–	120 – –	–	–	–	22 –	20 –	19 –	18 –	16 –	–	–	
41	Nairn -	Nairn -	3,437	1	3,437	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	11 6	–	
42	Newburgh -	Fife -	2,300	1	2,300	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	15 –	–	–	
43	Paisley -	Renfrew -	47,419	44	1,078	–	1	1	1	–	4	37	–	200 – –	78 –	65 –	–	23 –	–	20 –	18 –	16 6	–	–	
44	Partick -	Lanark -	10,917	15	727	–	1	–	–	–	2	12	–	140 – –	–	–	–	23 –	22 –	20 –	19 –	18 –	–	–	
45	Perth -	Perth -	23,000	25	920	–	1	–	2	2	3	17	–	200 – –	–	57 4	21 19	20 –	–	19 –	17 6	16 –	–	–	
46	Pulteneytown -	Caithness -	5,000	2	2,500	.	–	–	–	–	–	2	–	–	–	–	–	–	–	–	17 8	15 –	–	–	
47	Renfrew -	Renfrew -	3,731	4	932	–	1	–	–	–	1	2	–	100 – –	–	–	–	[1] 21 –	–	[1] 17 –	16 –	–	–	–	[1] And free houses
48	Rothesay -	Bute -	7,122	5	1,424	–	1	–	–	–	–	4	–	53 6 –	–	–	–	–	–	17 6	17 –	–	–	–	
49	Stirling -	Stirling -	13,714	14	979	–	1	–	–	–	2	11	–	[1] 70 – –	–	–	–	21 –	19 –	18 –	16 –	–	–	–	[1] And 5 *l.* for house.
50	Stranraer -	Wigtown -	6,274	5	1,254	–	1	–	–	–	–	4	–	76 – –	–	–	–	–	–	–	16 –	–	–	–	
51	Wick -	Caithness -	2,000	2	1,000	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	16 –	15 –	–	–	
		TOTAL - -	1,177,615	1,798	655																				

John Kinloch.

Counties.

COUNTIES.

No. 1.—ABERDEENSHIRE.

Aberdeenshire.

Population in 1861 - - - - -	156,439
Area in square acres - - - - -	1,270,740
Strength of force - - - - - -	69
Population to each constable - - - -	2,267

One chief constable, one superintendent, seven inspectors, six serjeants, and 54 constables, in four classes (one supernumerary).

This force is the same as last year, as to numbers and rate of pay.

One of the constables is stationed at Balmoral, and paid by Her Majesty. There has been a constable stationed at Glass, paid half by this county and half by Banffshire, his beat extending into both counties.

The burgh of Peterhead forms a separate police district of the county.

Two constables were appointed for Peterhead Harbour Works, and there is a constable employed on the Aboyne Extension Railway at present being constructed.

There are 21 officers and constables appointed as Sheriff's officers on criminal business in all parts of the county, except in the Peterhead district.

The small burgh of Fraserburgh still maintains a police force of its own, separate from that of the county.

A serjeant has been appointed superintendent of the city of Elgin police; one constable resigned on private family business, and one was dismissed.

1,770 vagrants, 647 of them children, were reported by the police during the year, being 589 less than last year.

The "Trespass Act" of last session has been enforced in this county. 12 convictions of breach of that Statute were obtained for encamping and entering barns, and these have had the effect of deterring tinkers from continuing their long-established customs, and have tended to diminish the number of cases of vagrancy.

The police force of this county have been very actively engaged in enforcing the Orders in Council, and Regulations of the justices and local authority in regard to the Cattle Plague, and with considerable success, several outbreaks of the plague having been immediately "stamped out." 42 extra constables have been employed to assist the regular constables in carrying out this important duty.

This force continues to be composed of a fine and intelligent body of men, and maintained in a good state of efficiency and discipline.

No. 2.—ARGYLESHIRE.

Argyleshire.

Population in 1861 - - - - -	79,724
Area in square acres - - - - -	2,083,126
Strength of force - - - - - -	44
Population to each constable - - - -	1,812

One chief constable, two superintendents, two inspectors, three serjeants, one detective, and 35 constables, in three classes.

This force continues the same as the year before.

A serjeant and 10 constables are employed by the "Board of British Fishery," on Loch Fyne.

The burgh of Campbeltown has been united to the county for police purposes, under 61st section of the Act, for the last two years.

A new

A new police station at head quarters at Lochgilphead, at Inverary, and one at Dunoon, are at present under consideration of the authorities; they are very much required at each of these places.

The cells at Campbeltown have been improved.

The population of that part of the Cowal district, including Dunoon, Inellan, Kirn, and Sandbank, is increasing so rapidly as to call for an addition to the police force, and it will probably require to be made a separate police district, under the 58th section of the Act.

Argyleshire has hitherto escaped from the cattle plague, no doubt arising, in great measure, from the precautions taken by the justices and local authority in employing 21 extra constables to keep a strict watch at the different ports and passes by which it might have been introduced from infected districts.

1,763 vagrants, of whom 784 were children, were reported by the police during last year, being 250 less than the year before.

The "Trespass Act" has partly been the means of this diminution of the number of vagrants, but too much encouragement is given by farmers and others allowing tramps, tinkers, and other vagrants to occupy premises about their farms and outhouses.

There were six vacancies in the force last year; four resignations and two dismissals.

The force has been efficient.

No. 3.—AYRSHIRE.

Ayrshire.

Population in 1861 - - - - - -	167,103
Area in square acres - - - - - -	650,156
Strength of force - - - - - -	87
Population to each constable - - - -	1,920

One chief constable, two superintendents, four inspectors, 10 serjeants, four detectives, and 66 constables, in four classes.

The same as to numbers as last year.

This force includes two constables paid for by the burgh of Maybole. There are also a serjeant and constable under the 7th section of the Statute; the former employed by the "Board of Fisheries," and the latter by the District Salmon Fishery Board of the River Girvan.

The superintendents are provided with spring carts and horses for conveying prisoners, and the weights and measures. They are allowed 40 *l.* a-year for forage, besides necessary expenses of stable and farriery.

They also receive 10 *l.* a-year to provide their uniform.

Two inspectors have been appointed acting superintendents at Dalry and Maybole, and proposed to be made permanent appointments. They receive 15 *l.*, in addition to their pay as inspectors.

A detective is stationed in each of the four districts of the county.

The serjeants are divided into two classes, with 24 *s.* 6 *d.* and 22 *s.* 6 *d.* per week.

A new station has been erected at Saltcoats.

The probationary class of former years has now been added to the 3d class, with 17 *s.* per week.

"Good service pay," at the rate of 1 *s.* per week, in addition to the regular pay of their class, has been established since April 1864 for detectives, and 1st, 2d, and 3d class constables, after five years' service with good conduct; and as the result has proved highly satisfactory, it is now proposed to extend the benefit to other ranks and classes.

The station at Largs is much in need of improvement; and accommodation for a resident constable, and lock-up are required at Maybole, those at present in use being very bad.

The manufacturing and mining population of this county has increased, and is still increasing so rapidly, that a further addition to this force will be required very soon, if not immediately.

Newton and Wallacetown also require additional constables.

18 vacancies took place during last year; nine resignations, six dismissals for misconduct, and three discharged for inability.

Counties.

The constabulary of this county have been employed in carrying out the Orders in Council, the Regulations of the justices and local authority with regard to the Cattle Plague, which happily has not raged to any great extent among the dairy herds of Ayrshire.

12,321 vagrants, including 1,218 children, have been reported by the police during last year, being 157 less than the year before.

The offices, stations, and lock-ups in this county continue to be kept particularly clean and in good order.

This force has been maintained in a state of efficiency and good discipline during the year, but will require an increase soon for the reasons above stated.

No. 4.—BANFFSHIRE.

Banffshire.

Population in 1861 - - - - - -	52,149
Area in square acres - - - - - -	439,219
Strength of force - - - - - -	17
Population to each constable - - - -	3,067

One chief constable, one superintendent, two serjeants, and 13 constables, in three classes.

This force continues the same as to numbers and rate of pay, as before reported.

The superintendent at Banff has been appointed chief constable of Kirkcudbrightshire, and the serjeant at Keith has been promoted to his place.

A constable at Glass was paid partly by this county and partly by Aberdeenshire, but in future he is to be employed by Banffshire only,

Nine police stations are occupied, rent free, by married serjeants and constables.

530 vagrants, of whom 217 were children, were reported by the police during the past year, being 15 less than the year before.

Ten extra constables were appointed to carry out the orders of the Justices and local authority, with regard to the cattle plague, which has not as yet visited this county.

The force is efficient.

There were no changes in this force during last year.

No. 5.—BERWICKSHIRE.

Berwickshire.

Population in 1861 - - - - - -	36,613
Area in square acres - - - - - -	309,375
Strength of force - - - - - -	23
Population to each constable - - - -	1,592

One chief constable, one superintendent, four serjeants, and 17 constables, in three classes.

A supernumerary constable has been added to this force for training, to be available for a beat when a vacancy occurs.

There were eight extra constables employed during the winter months, under the "Poaching Prevention Act." Three permanent and four temporary constables were employed in protection of salmon fishing.

There were 33 persons prosecuted, and 22 convicted, under the Salmon Fishing Acts, and fined 51 *l.* 9 *s.* 9 *d.*

There were five resignations in the force during the year.

A police-station has been erected at Eyemouth, and the cells of the stations at Coldstream, Dunse, Earlston, and Lauder, have been improved and provided with means for warming them in damp and cold weather.

A new station is proposed to be erected at Coldstream.

745 vagrants, 240 of them children, have been reported by the police, being 466 less than the year before.

The "Trespass Act" has acted beneficially in this county in reducing the number of Gipsies, Tinkers, and "Muggers;" and those persons are not so much encouraged as formerly by farmers and others allowing them to lodge in their barns and outhouses.

The

Counties.

The constabulary of this county have been actively employed in carrying out the Orders of Council and Regulations of the "local authority" in regard to the Cattle Plague, but no extra men were employed for this purpose.

The force is maintained in a state of efficiency and good discipline.

No. 6.—BUTESHIRE.

Buteshire.

Population in 1861 - - - - - -	9,209
Area in square acres - - - - - -	109,375
Strength of force - - - - - -	7
Population to each constable - - - -	1,315

One chief constable, one serjeant, and five constables, in three classes.

This force for the Islands of Bute, Arran, and Cumbrae, continues the same as last year.

No police office or station has yet been provided at head quarters at Rothesay, or at Millport in Cumbrae.

Thirty-eight vagrants, seven of them children, were reported by the police during last year, being two more than the year before.

The population of the county, including the burgh of Rothesay (7,122), is only 16,331, for which there is a police force for the county of seven men (a chief constable, serjeant, and five constables); and for the burgh, a superintendent, and four constables, in all 12 men, who would be more efficient and useful to the public if united under the command of one chief officer.

The force is efficient.

No. 7.—CAITHNESS-SHIRE.

Caithness-shire.

Population in 1861 (about) - - - -	35,000
Area in square acres - - - - -	455,708
Strength of force - - - - - -	15
Population to each constable - - - -	2,333

One chief constable, three serjeants, and 11 constables, in three classes.

A constable has been added to the force for the Canisby district.

The serjeant at Thurso is allowed 30 *l.* a year to provide a horse and dog-cart.

A new police office, and cells for prisoners, have been provided in the new county buildings.

The proposed station at Lybster has not yet been built.

Two vacancies occurred during the year, one by death and one resigned.

533 vagrants were reported by the police during the last year, being 87 less than the year before.

The constables have been employed in the Cattle Plague duties, which has not yet appeared in this county.

The force is efficient.

No. 8.—CLACKMANNANSHIRE.

Clackmannanshire.

Population in 1861 - - - - -	15,010
Area in square acres - - - - - -	29,744
Strength of force - - - - - -	7
Population to each constable - - - -	2,144

One superintendent, and six constables, in two classes.

This force remains the same as to numbers as last year, and is under the same chief constable as Perthshire.

The serjeant has been appointed keeper of the new county buildings.

One constable resigned.

There is no proper office for the police at head-quarters at Alloa. Two cells have been provided in the new county buildings. No improvement has been made in the cells at Tillicoultry, which are cold, damp, and unprovided with means for drying or warming them in winter.

678 vagrants,

Counties.

678 vagrants, 301 of them children, were reported by the police, being 228 more than the year before.

The force is efficient.

No. 9.—CROMARTYSHIRE.

Cromartyshire.

Population in 1861 - - - - - - -	2,267
Strength of force - - - - - - -	None.

No police force has yet been established in this county under the Act 20 & 21 Vict. c. 72.

No return of vagrants has been kept.

No. 10.—DUMBARTONSHIRE.

Dumbartonshire.

Population in 1861 - - - - - -	31,566
Area in square acres - - - - - -	189,844
Strength of force - - - - - -	22
Population to each constable - - - -	1,435

One chief constable, one superintendent, three serjeants, and 17 constables, in three classes.

A constable has been added to the force since last report.

Eleven married serjeants and constables have houses for 1*s.* per week; the others receive 1*s.* per week for lodging money.

There were three vacancies in the force last year, two resignations, and one dismissal.

The population of this county is increasing considerably.

1,639 vagrants, 457 of them children, were reported by the police during the year, being 371 less than the year before.

The constables have been actively engaged in Cattle Plague duties, but no extra men were employed.

The force is efficient.

No. 11.—DUMFRIES-SHIRE.

Dumfries-shire.

Population in 1861 - - - - - -	61,983
Area in square acres - - - - - -	722,813
Strength of force - - - - - -	32
Population to each constable - - - -	1,936

One chief constable, one superintendent, one inspector, four serjeants, one detective, and 24 constables, in two classes.

There are also six constables employed in the protection of various fisheries in the county.

The superintendent, inspector, and 19 of the serjeants and constables have stations or houses provided for them rent free; the others have 2 *s.* per week, if married, and 1 *s.* 6 *d.* if single, for lodging money, in addition to their pay.

Since September 1864 a "merit class" has been established for five of the serjeants and constables, who receive 1 *s.* per week in addition to the pay of their rank, after five years' service, with good conduct.

Since May 1865, the pay of serjeants and constables has been increased 1*s.* per week.

A good new station for a serjeant and constable, with two cells, has been erected at Langholm.

The stations and lock-ups at Moffat and Gretna are very inferior, and require improvement, or new stations to be erected in place of them.

In addition to great coats and the other usual articles of clothing, the serjeants and constables are provided with Highland cloaks for night-duty in severe weather.

There were nine vacancies in the force during the year, seven resignations, and two dismissals.

6,670 vagrants, 2,035 of them children, were reported by the police, being 1,047 more than the year before.

On

On the passing of the "Trespass Act" of last Session, some vagrants were apprehended by the police, taken before a justice, and dismissed on promising to leave the county.

Six extra constables have been employed to assist in the Cattle Plague duties; they are paid 18 *s.* per week.

The force is efficient in numbers and discipline.

No. 12.—County of Edinburgh, or Mid-Lothian.

Edinburgh, or Mid-Lothian.

Population in 1861 - - - - - -	72,248
Area in square acres - - - - - -	254,300
Strength of force - - - - - -	47
Population to each constable - - - -	1,537

One chief constable, one superintendent, four inspectors, four serjeants, and 37 constables, in four classes.

One constable has been added to this force during last year, and is stationed at West Calder, where there is an increasing population connected with the parafine oil works.

There is an extra constable employed at Portobello during the summer months.

There are two constables at Granton Harbour, one on the Edinburgh waterworks, and four on the railroads at present being constructed in different parts of the county.

A new station is now in course of erection at West Calder.

The burghs of Musselburgh and Portobello continue to be united to the county for police purposes.

A progressive rate of pay has been established in this force.

Superintendents, after five years' service, an increase of 7 *l.* per annum, and after 10 years' service an additional 10 *l.* Inspectors: after five years' service an increase of 5 *l.*, and after 10 years an additional 10 *l.* Constables: a merit class of four men are allowed 21 *s.* per week; second-class constables at 18 *s.*, to be increased to 19 *s.* after two years' service, and, after three more, to be first class at 20 *s.* per week; third-class constables at 17 *s.*, to be promoted to second class after two years' service.

There were 12 vacancies during the year, nine resignations, and three dismissals.

1,606 vagrants, 475 of them children, were reported by the police, being 324 more than the year before.

The constabulary have had a considerable amount of extra duty in carrying out the Orders in Council and Regulations of the local authority in regard to the Cattle Plague, but no additional men have been employed.

The chief constable acted as procurator fiscal in 40 cases of contraventions of the orders, and in 550 other cases in the justice of peace courts.

This force has been maintained in a state of efficiency and discipline.

No. 13.—Elgin, or Morayshire.

Elgin, or Morayshire.

Population in 1861 - - - - - -	31,644
Area in acres - - - - - - -	340,000
Strength of force - - - - - -	13
Population to each constable - - - -	2,433

One chief constable, two serjeants, and 10 constables, in three classes.

This force remains the same as to number as in my last report.

The constables have the use of the few stations in the county rent free.

There were three vacancies in the force: the serjeant at Forres has been appointed keeper of the new court house at Elgin; one constable resigned, and one was dismissed.

824 vagrants, 266 of them children, were reported by the police, being 412 less than the year before.

The

Counties.

The "Trespass Act" has been found to act beneficially in this county, and to reduce considerably the number of unlicensed hawkers, tramps, and other vagrants.

For the last few months the police have been much employed in the Cattle Plague duties, during which time from 8 to 15 extra men have been appointed as constables to assist in carrying out these duties.

The force is efficient.

No. 14.—Fifeshire.

Fifeshire

Population in 1861 - - - - - - -	144,070
Area in acres - - - - - - - -	322,031
Strength of force - - - - - -	58
Population to each constable - - - -	2,483

One chief constable, one superintendent, four inspectors, three serjeants, one detective, and 48 constables, in three classes.

A serjeant has been promoted to be inspector, making four inspectors, one for each district.

The burghs of Burntisland, Cupar, Dysart, Kirkcaldy, and St. Andrews continue to be united with the county.

The burgh of Newburgh still maintains an inefficient police of only one man.

New stations with lock-ups have been provided at Leslie and Kettlebridge; the cells are unprovided with any means of warming them in damp or cold weather, and have no windows in them, only small iron plates perforated with holes to admit air.

The former station and lock-up at Pathhead has been discontinued.

It is proposed to provide a new station at Leuchars in place of the one now in use.

The important station of Newport, opposite Dundee, is a very indifferent one, and I consider there ought to be two constables at that station.

The pay of the serjeants and constables has been increased by 6 *d.* a week. The detective has the rank of serjeant.

The number of offences reported by the police, and the number of convictions, show a considerable increase above last year, and testify to the activity of the police.

In addition to crimes and offences, there have been 232 accidents (40 of them fatal), 68 sudden deaths, 10 suicides, 9 attempts at suicide, 1 death from exposure, 26 fires, and 10 shipwrecks, all investigated by the police, and reported to the procurator fiscal.

The constabulary of this county have been much employed in duties connected with the Cattle Plague which prevailed to a serious extent, but no additional men were employed for this purpose.

The chief constable of this county is also required to act as procurator fiscal to the justices of the peace for the prosecution of poaching cases, public-houses and road cases, requiring his frequent attendance at petty sessions, in the four districts of the county, and thus taking up much time that might be more properly employed in the police duties of this populous and extensive county. The five burghs above mentioned, being united with the county, add to the chief constable's duties.

3,398 vagrants, 756 of them children, were reported by the police during last year, being 1,481 more than the year before.

This great increase, of nearly 1,500, may be attributed in some degree to the number of persons who come to seek employment in the manufactories and mines in the county.

There were 13 vacancies during the year, six resignations, and seven dismissals.

The force is maintained in a state of efficiency and good discipline.

No 15.—FORFARSHIRE.

Forfarshire.

Population in 1861 - - - - - -	61,917
Area in acres - - - - - - -	568,750
Strength of force - - - - - -	32
Population to each constable - - - -	1,935

One chief constable, two superintendents, two inspectors, three serjeants, and 24 constables, in four classes.

Two constables were added to the force during last year.

There are also two other constables, one paid by the Earl of Dalhousie, and the other by the Caledonian Railway Company.

The situation of superintendent of the Dundee district, and to attend to the procurator fiscal's office in criminal business, has been vacant for eight months, the salary at present offered (80 *l.* a year) being insufficient to secure the services of a properly qualified officer for these important duties.

No new station has yet been erected in this county since the passing of the Act in 1857.

The station at Broughty Ferry is particularly bad.

1,758 vagrants, 300 of them children, were reported by the police, being 509 less than the year before.

The police were not employed, as in many other counties, in carrying out the Orders in Council and Regulations of the local authority with regard to the Cattle Plague, although it was more serious and fatal in its attacks than in any other county in Scotland.

The force is efficient.

No. 16.—HADDINGTONSHIRE, OR EAST LOTHIAN.

Haddingtonshire, or East Lothian.

Population in 1861 - - - - - -	29,941
Area in acres - - - - - - -	185,937
Strength of force - - - - - -	26
Population to each constable - - - -	1,151

One chief constable, one superintendent, one detective, three serjeants, and 20 constables, in three classes.

A supernumerary constable has been appointed for training, to take charge of a station or beat when a vacancy occurs.

A first-class constable has been appointed detective, with 23 *s.* per week.

There were five resignations in the force during the year.

The chief constable of this county holds the same appointment in the adjoining county of Berwick.

The burghs of Dunbar and Haddington continue to maintain separate police forces of their own.

There are nine stations occupied by serjeants and constables, who pay 1 *s.* per week for rent.

1,318 vagrants, 133 of them children, were reported by the police, being 117 more than the year before.

The "Trespass Act" has had some good effect in this county, but the system of having "tramp houses" at Haddington and Dunbar, and police escort of vagrants out of the county, had already prevented "tinkers" and "muggers" from encamping on roads and in inclosed places.

The constabulary of this county have been actively employed in carrying out the Orders in Council and Regulations of the "local authority" in regard to the Cattle Plague, but no extra men were employed.

This force continues in a state of efficiency and good discipline.

Counties.

No. 17.—Inverness-shire.

Inverness-shire.

Population in 1861 - - - - - -	76,389
Area in acres - - - - - - -	2,723,501
Strength of force - - - - - -	37
Population to each constable - - - -	2,064

One chief constable, one superintendent, three inspectors, two serjeants, and 30 constables, in three classes.

One constable has been added to the force during last year.

Police-stations have been erected at Kingussie and Fort William, and one is about to be built at Portree, in the Isle of Skye.

Many of the beats of this county, in the west and north in particular, are very extensive; and houses for the constables are much required, and lock-ups for prisoners.

Three constables were employed in protecting salmon fishing in the Ness.

921 vagrants, 384 of them children, were reported by the police, being 483 less than the year before.

Several vagrants were prosecuted under the "Trespass Act," which had the effect of diminishing vagrancy for some time afterwards.

The constables have been much engaged in carrying out the Orders in Council and Regulations of the local authority in the Cattle Plague duties, particularly along the Caledonian Canal, which was fixed on as a line not to be passed by cattle or sheep.

Eleven extra men were employed to assist the force in carrying out these duties.

The pay of the superintendent was raised 5 *l.*, and that of the serjeants and constables one shilling per week.

The force is efficient.

No. 18.—Kincardineshire.

Kincardineshire.

Population in 1861 - - - - - -	34,466
Area in acres - - - - - - -	252,250
Strength of force - - - - - -	15
Population to each constable - - - -	2,297

One chief constable, three serjeants, and 11 constables, in three classes.

No additional constable has as yet been appointed at Banchory, but I understand it is proposed to appoint one there soon.

The station at Laurencekirk, and lock-ups, require improvement.

The insurance on the lives of the serjeants and constables, paid partly by themselves and partly by the county, gives satisfaction, by providing a sort of superannuation fund for them.

There were no changes in this force during the year.

621 vagrants, 245 of them children, were reported by the police, being 59 more than last year.

The "Trespass Act" has had no visible effect in this county.

Seven extra constables were employed in the Cattle Plague duties; the disease has been very destructive in this county.

The force is efficient.

No. 19.—Kinross-shire.

Kinross-shire.

Population in 1861 - - - - - -	7,977
Area in acres - - - - - - -	49,531
Strength of force - - - - - -	5
Population to each constable - - - -	1,595

One superintendent, and four constables.

This force is under the same chief constable as Perthshire; the superintendent resides at the head-quarters station attached to the county buildings, rent free.

The

The constable at Milnathort has a station, rent free, the others pay 1 *s.* per week for their lodgings.

398 vagrants, 93 of them children, were reported by the police, being 52 more than last year.

The force is efficient.

No. 20.—KIRKCUDBRIGHTSHIRE.

Kirkcudbrightshire.

Population in 1861 - - - - - -	38,849
Area in acres - - - - - - -	610,734
Strength of force - - - - - -	18
Population to each constable - - - -	2,158

One chief constable, one superintendent, one serjeant, and 15 constables, in three classes.

This force continues the same as to number and rate of pay as last year.

A constable is appointed and paid by the Game Association in the Maxwelltown district.

The serjeant and constables in stations are rent free; those unprovided with houses are allowed 4 *l.* a year if married, and 3 *l.* if single, as lodging money, in addition to their pay.

I am still of opinion that there ought to be another constable stationed at Castle Douglas, where there is a large population, and a country beat for the one man at present, there.

The cells at Creetown, Dalbeattie, Kirkcudbright, New Abbey, and New Galoway, are still unprovided with means for drying or warming them in damp and cold weather.

There were two vacancies in the force, one resignation, and one dismissal.

4,132 vagrants, 807 of them children, were reported by the police, being 751 less than the year before.

There were four prosecutions under the "Trespass Act," which may have tended to diminish the number of vagrants last year.

Four extra men have been employed in connection with the Cattle Plague duties, who have 16 *s.* per week, and the same allowance for lodgings and boot-money as the regular constables.

The force is efficient.

No. 21.—LANARKSHIRE.

Lanarkshire.

Population in 1861 - - - - - -	176,452
Area in acres - - - - - - -	593,680
Strength of force - - - - - -	149
Population to each constable - - - -	1,184

One chief constable, five superintendents, six inspectors, 18 serjeants, and 119 constables, in three classes.

Six constables have been added during last year.

The population of this county increases rapidly, and is much greater than when the census was taken in 1861.

There were 24 vacancies in the force, 11 resignations, and 13 dismissals.

Four railway constables were also dismissed.

There are eight constables appointed on the railways being constructed through this county.

New police-stations for two constables have been erected at Shotts and Douglas, but they were not finished at the time of my inspection.

Horses and spring-carts are provided for the superintendents of divisions, for conveying prisoners and the standard weights and measures.

An allowance of 40 *l.* a year is made to each superintendent for the keep of the horses, in addition to his salary of 150 *l.* a year.

The serjeants and constables pay 1 *s.* per week for rent for the stations occupied by them.

The weights and measures are still under charge of the police, an arrangement that appears to give satisfaction.

Counties.

2,883 vagrants, 665 of them children, were reported by the police, being 660 less than the year before.

There were no extra men employed in the Cattle Plague duties.

This force has been maintained in a state of efficiency and discipline during last year.

No. 22.—Linlithgowshire.

Linlithgowshire.

Population in 1861 - - - - - - -	38,645
Area in acres - - - - - - -	64,375
Strength of force - - - - - -	20
Population to each constable - - - -	1,932

One chief constable, one superintendent, two serjeants, and 16 constables, in three classes.

The town and parish of Bathgate form a separate police district, with a serjeant and six constables.

The serjeants and constables pay 1 *s.* per week for the use of station-houses; those not so provided receive 1 *s.* per week for lodging-money.

Stations are now in the course of being built at Bo'ness and South Queensferry.

There were six vacancies in the force during the year, five resignations, and on edismissal.

869 vagrants, 76 of them children, were reported by the police, being one less than the year before.

The "Trespass Act" has put a stop to tinkers encamping on roads, in woods, and inclosed places, but other descriptions of vagrants are not in any way affected by it.

There have been no extra men employed for Cattle Plague duties.

The force is efficient.

No. 23.—Nairnshire.

Nairnshire.

Population in 1861 - - - - - - -	6,628
Area in acres - - - - - - -	137,500
Strength of force - - - - - -	4
Population to each constable - - - -	1,657

One chief constable, and three constables.

The constable formerly appointed to protect the salmon-fishing in the River Nairn, and to assist in other police duties, has been discontinued.

All the constables are in one class, at the minimum pay of 15 *s.* per week, out of which they find their own lodgings.

There is no police-office or lock-up in the county.

236 vagrants, 76 of them children, were reported by the police, being 54 less than the year before.

From the result of my visit and inquiries into the state of this force, I regret that I am unable to report it in a satisfactory state of efficiency or discipline for the last year; the lowness of the pay prevents the chief constable from finding a properly qualified candidate for a vacancy when it occurs, even in this small force.

No. 24.—Peebles-shire.

Peebles-shire.

Population in 1861 - - - - - - -	11,408
Area in acres - - - - - - -	226,488
Strength of force - - - - - -	8
Population to each constable - - - -	1,426

One chief constable, one serjeant, and six constables.

This regular police force of this county is the same as last year.

Four permanent and eight temporary constables were employed by the "Tweed Commissioners," for the protection of salmon-fishing; they were paid 20 *s.* per week.

Forty-seven persons were convicted of salmon poaching, under the "Tweed Acts," and fined 210 *l.* 8 *s.* 11 *d.*, including 56 *l.* 3 *s.* 11 *d.* of expenses.

Many leisters, nets, and two carts, besides salmon, were seized and taken from the poachers. Seven of the poachers were imprisoned for non-payment of the fines inflicted.

The lock-ups at Innerleithen and West Linton have been improved, and provided with means for drying and warming them in damp and cold weather.

285 vagrants, 80 of them children, were reported by the police, being 173 less than the year before.

The "Trespass Act" has had a good effect in diminishing vagrancy in this county. There were three convictions under the Act.

The police have been actively employed in the cattle plague duties, but no extra men were employed.

The force is efficient.

No. 25.—PERTHSHIRE.

Perthshire.

Population in 1861 - - - - - -	106,900
Area in acres - - - - - -	1,814,063
Strength of force - - - - - -	55
Population to each constable - - - -	1,943

One chief constable, one superintendent, two inspectors, two detectives, eight serjeants, and 41 constables, in three classes.

This force continues the same as to numbers and rate of pay as last year.

Two good stations have been erected at Blackford and Pittochrie.

A house has been purchased at Dunblane for a station to accommodate two constables, with two cells.

New stations are much required at Aberfeldy and Rattray; but I am informed that suitable sites cannot at present be obtained; and at Crianlarich the constable is unprovided with lodgings, and has difficulty in obtaining any.

4,328 vagrants, 1,680 of them children, were reported by the police, being 366 less than the year before.

The "Trespass Act" has only recently been ordered to be adopted and acted upon in this county, but has already had the effect of causing tinkers and tramps to live in some of the villages, where they threaten to be troublesome neighbours.

The police of this county have had a great deal of extra work to perform in carrying out the Orders in Council and Regulations of the local authority in regard to the Cattle Plague, which has raged to a serious extent; two extra constables have been employed to assist the rest of the force in these duties, under the chief constable.

The chief constable of Perthshire holds the same appointment in the neighbouring counties of Kinross and Clackmannan; he has also the charge of about 40 water bailiffs in protecting the salmon fishing in the River Tay and its tributaries, and the inspector of the weights and measures of this extensive county.

But in addition to the above numerous duties connected with the police, he is also required to prosecute in contravention of "Public-houses and Road Acts," before the sheriff or justices at Perth, Aberfeldy, Blairgowrie, Crieff, and Dunkeld, occupying much time that might be more properly devoted to police business.

There were six vacancies in the force during the year, one by death, two resignations, two dismissals, and one desertion.

The force has been efficient during the past year.

No. 26.—RENFREWSHIRE.

Renfrewshire.

Population in 1861 - - - - - -	77,304
Area in acres - - - - - - -	150,000
Strength of force - - - - - -	40
Population to each constable - - - -	1,932

One chief constable, one superintendent, four inspectors, seven serjeants, and 27 constables, in three classes.

One constable has been added to the force.

The burgh of Port Glasgow is still united to the County for police purposes, and pays for four constables.

A serjeant and constable are employed as sheriff's officers and detectives at Paisley

Counties.

Paisley and Greenock. An additional detective is required for Pollockshaws and vicinity.

I am still of opinion that the Pollockshaws district, immediately adjoining Glasgow, should be formed into a separate police district, and the force increased; the population is increasing rapidly.

A new station has been erected at Lochwinnoch; but it was not finished at the time of my inspection.

A station is to be provided at Gourock for two constables.

There were 10 vacancies in the force during the year, one from death, and nine resignations.

An inspector was appointed governor of Easter Ross Poorhouse.

1,333 vagrants, 283 of them children, were reported by the police, being 633 less than the year before.

Six extra constables were appointed to assist in carrying out the Orders in Council and Regulations of the local authority in regard to the Cattle Plague. They get 18 *s.* per week, and 6 *d.* per week boot-money.

The force has been efficient during the last year; but I am of opinion that an increase will soon be required in the eastern part of the county.

No. 27.—Ross-shire.

Ross-shire.

Population in 1861 - - - - -	77,648
Area in acres - - - - - -	2,016,375
Strength of force - - - - - -	28
Population to each constable - - - -	2,773

One chief constable, two superintendents, one inspector, two serjeants, and 22 constables, in three classes.

The burgh of Dingwall has united with the county under the 61st section of the Act, and pays for two constables now added to the number of the county force.

Police stations have been built during last year at Dingwall, Gairloch, Grantown, Tain, and Ullapool, but they were not finished at the time of my inspection, and a station is in the course of erection at Fortrose; but none has yet been built at Stornoway in the Island of Lewes, where it is more required than any where else in the county.

There were more persons apprehended by the police in the Island of Lewes than in both districts of Easter and Wester Ross in the Mainland; viz., 161 persons (14 more than the year before), and on the Mainland there were 147 (being 39 less than the year before).

The chief constable of this county is required to act as procurator fiscal to the justices of peace in statutory offences, such as the "Road" and "Public-house Acts," "Salmon Fishing" and "Game Acts," and latterly under the "Cattle Plague Act," "Orders in Council," &c.

There were during last year 25 cases against the Game Laws prosecuted by the chief constable, who is required, in connection with these duties, to attend petty sessions courts at Lochalsh, Gairloch, Jeantown, Ullapool, Tain, Fortrose, Invergordon, Munlochy, and Tarradale—places varying from seven to 64 miles from head-quarters at Dingwall.

There were four cases of sheep-stealing, three in the Island of Lewes, and one on the Mainland, which were cleverly detected by the police, and the offenders convicted.

There were three vacancies during the year, one death and two resignations.

573 vagrants, 132 of them children, were reported by the police, being 329 more than last year.

No notice of the "Trespass Act" has been taken in this county; it has remained a dead letter, while the adjoining and other counties in Scotland have carried out the Act with more or less activity and vigour, and this may probably account for the increase of 329 cases of vagrancy during the last year.

The police of this county have been actively employed in carrying out the Cattle Plague duties, and three extra constables have been engaged to assist the rest of the force.

The force appears to have been efficient during last year.

Counties.

No. 28.—ROXBURGHSHIRE.

Roxburghshire.

Population in 1861 - - - - - -	39,114
Area in acres - - - - - - -	460,938
Strength of force - - - - - -	34
Population to each constable - - - -	1,150

One chief constable, one superintendent, five serjeants, and 27 constables, in four classes.

This force is the same as to numbers as the previous year.

Two constables, as a reserve for training until a station or beat is vacant, have been authorised to be added.

A new chief constable has been appointed during last year.

The pay of the superintendent has been raised from 85 *l.* to 100 *l.* a year.

A merit class, with 20 *s.* per week, has been made, and there is no limit now to the number of the first class, and constables from the lower classes may be promoted to it, if duly qualified.

Married serjeants and constables have the use of stations rent free, and single men have 2 *s.* per week for lodging money.

There are also eight permanent constables employed in protecting the salmon fishings by the "Tweed Commissioners," and one by the "Esk and Liddesdale Fishery Association."

Fifty-three persons were prosecuted, and 39 convicted, under the Tweed Acts, and were fined to the amount of 111 *l.* 16 *s.* including expenses; 12 of them were sent to prison on failure of payment.

1,275 vagrants, 81 of them children, were reported by the police, being 90 less than last year.

The Trespass Act has not proved of much benefit in this county.

There were 14 resignations and four dismissals during the year; so that 18 of the force are of less than a year's service.

The constables employed in protecting the salmon fishing are paid the same as the other constables, and have the same allowances.

The police are actively employed in carrying out the Orders in Council and Regulations of the local authority in regard to the Cattle Plague, but no extra men were employed.

Notwithstanding the numerous changes that have taken place, I consider the force has been maintained in a state of efficiency and discipline during the past year, and that these changes will tend to improve its efficiency in future.

No. 29.—SELKIRKSHIRE.

Selkirkshire.

Population in 1861 - - - - - -	7,449
Area in acres - - - - - - -	170,313
Strength of force - - - - - -	9
Population to each constable - - - -	827

One chief constable, one serjeant, and seven constables, in one class.

All the constables in this county are provided with good stations rent free, and 18*s.* per week. The serjeants have 22 *s.* per week, and free house.

There is only one constable now employed on the Railway works.

There are two permanent serjeants and seven constables in close time, employed to protect the salmon fishing in the Tweed and its tributaries.

There were 37 prosecutions under the Tweed Acts—21 convictions. The fines, with costs, amounted to 53 *l.* 16 *s.*

1,421 vagrants, 573 being children, were reported by the police, being 872 more than last year. This large increase is owing partly to the children being added this year (as formerly only adults were reported), and partly to the number of the wives and children of the navvies hitherto employed on the Galashiels and Peebles Railway begging and seeking employment in the county, who are not affected by the Trespass Act.

The force is efficient.

No. 30.

Counties.

No. 30.—Stirlingshire.

Stirlingshire.

Population in 1861 - - - - - -	78,212
Area in acres - - - - - - -	295,875
Strength of force - - - - - -	35
Population to each constable - - - -	2,120

One chief constable, two superintendents, five serjeants, and 27 constables, in three classes.

There were seven vacancies in the force during the year—one death, five resignations, and one dismissal.

A new police station for two constables has been erected at Denny.

The stations and lock-ups at Falkirk and Grangemouth are very indifferent, the latter in particular, which is not secure, as a prisoner escaped from it.

Stations with lock-ups appear to be required at Bridge of Allan, where there is a large population, greatly increased at particular seasons; also at Lennoxtown, and Slamannan where there is a considerable mining population.

The police for Falkirk and vicinity is very small, being only three constables, and the superintendent of the district, for a population of upwards of 17,000 inhabitants; and there is no night watch or patrol for the burgh of Falkirk, with 9,030 inhabitants. An increase of constables to this populous district appears to be much required.

The chief constable of this county has also the charge of the salmon fishing in the River Forth, with 17 water bailiffs employed during "close" time.

There were 1,421 vagrants, 219 of them children, reported by the police, being 196 more than last year.

There were 10 extra men employed in the cattle plague duties, but their services have been discontinued.

The Rinderpest prevailed to a great extent in this county.

The force appears to have been efficient during last year, but an increase will soon be required for the increasing population, and for the Falkirk district, as before mentioned.

No. 31.—Sutherlandshire.

Sutherlandshire.

Population in 1861 - - - - - -	25,246
Area in acres - - - - - - -	1,207,188
Strength of force - - - - - -	9
Population to each constable - - - -	2,805

One chief constable, one serjeant, and seven constables, in two classes.

This force remains the same as in last report.

An additional constable is employed at Helmsdale during the herring fishing season, when the population is greatly increased by fishermen and persons connected with the trade.

The serjeant at head quarters at Dornoch, and constables at Bettyhill, Lochinuer, and Rhiconich, have houses rent free, those at Brora, Bonarbridge, Golspie, and Helmsdale, provide their own lodgings.

One constable resigned during the year.

Three constables are employed on the railway now being constructed to Golspie.

344 vagrants, 109 of them children, were reported by the police, being 18 more than last year.

The "Trespass Act" has had a beneficial effect in this county, as it has been the means of several tribes or gangs of tinkers leaving the country and emigrating to America.

The police have carried out the Cattle Plague Orders in Council, and Regulations of the local authority, without extra assistance.

The force is efficient.

No. 32.—WIGTOWNSHIRE.

Wigtownshire.

Population in 1861 - - - - - -	38,115
Area in acres - - - - - - -	327,815
Strength of force - - - - - -	16
Population to each constable - - - -	2,382

One chief constable, one superintendent, one serjeant, and 13 constables, in two classes.

This force remains the same as to numbers and rate of pay as the year before.

There were five vacancies in the force, three resignations, and two dismissals.

The proposed station with lock-ups, at Glenluce, has not yet been provided.

There is still only one constable at Newton Stewart, a populous town, with a considerable extent of country in his beat, which requires another man to discharge the police duties efficiently.

530 vagrants, 97 of them children, were reported by the police, being 751 less than the year before.

The "Trespass Act" was strictly carried out in this county by the police, and with satisfactory results, as in the neighbouring county of Kirkcudbrightshire, where there were the same number (751) of cases less than the year before.

The force is efficient.

Cities and Burghs.

CITIES AND BURGHS.

No. 1.—CITY of ABERDEEN (County of Aberdeen).

Aberdeen.

Population in 1861 (about)	62,000
Strength of force	88
Population to each constable	704

One superintendent, two lieutenants, two detectives, seven serjeants, and 76 constables, in three classes.

This force remains the same, as to numbers and rate of pay, as last year.

Three extra constables are employed on the "railway extension works."

Fourteen vacancies occurred, one death, 11 resignations, and two dismissals.

The police office and cells remain as before; the proposed new buildings are not erected.

The custom prevails in this city, as in some burghs, of giving "protection" to persons in the cells at night, who are found in the streets, and which encourages them to demand this mode of obtaining lodgings instead of paying for them elsewhere.

There are no houses or lodgings provided for any of the police force.

This force has been efficient during the last year.

No. 2.—AIRDRIE (County of Lanark).

Airdrie.

Population in 1861	12,918
Strength of force	11
Population to each constable	1,174

One superintendent, one inspector, one detective, one serjeant, and seven constables, in three classes.

This force is the same as reported the year before; one of the constables acts as detective.

The superintendent is inspector of weights and measures.

The whole force act as a fire brigade, and have charge of the engines.

The force is efficient.

No. 3.—ALLOA (County of Clackmannan).

Alloa.

Population in 1861	6,440
Strength of force	4
Population to each constable	1,610

One superintendent and three constables, in one class.

This force continues the same as to numbers as before reported, but there is no serjeant now, only three constables.

The constables have 15*s.* per week, with free lodgings, coals and gas.

This burgh might with advantage unite with the county for police purposes; the county force consists of seven men, and the burgh of four; and the population of the county and burgh together is only 21,450.

The force is efficient.

No. 4.—ANNAN (County of Dumfries).

Annan.

Population in 1861	3,473
Strength of force	2
Population to each constable	1,736

One superintendent and one constable.

A constable has been added to the force of this burgh last year, but I cannot report it as efficient.

No. 5.

No. 5.—Arbroath (County of Forfar).

Arbroath.

Population in 1861 - - - - - -	17,657
Strength of force - - - - - -	15
Population to each constable - - - -	1,177

One superintendent, three serjeants, and 11 constables, in three classes.

A new superintendent has been appointed, and a constable added to the force during last year, which, owing to the increase of the population, was necessary.

A small addition has been made to the pay of the serjeants and constables, who have also 6*d.* per week boot money.

Two constables have resigned, and three been dismissed.

The cells of the police office are frequently occupied by vagrants for protection.

The force is efficient.

No. 6.—Ardrossan (County of Ayr).

Ardrossan.

Population in 1861 - - - - - - -	2,951
Strength of force - - - - - - -	1
Population to each constable - - - -	2,951

The "burgh officer" is the only constable, and is inefficient as a police force.

No. 7.—Ayr (County of Ayr).

Ayr.

Population in 1861 - - - - - -	8,219
Strength of force - - - - - - -	10
Population to each constable - - - -	821

One superintendent, two serjeants, and seven constables, in two classes.

This force is the same as to numbers as the year before.

An addition has been made to the pay of the constables, and they are divided into two classes; the first class receives 17*s.* 6*d.*, and the second class 16*s.* 6*d.* per week.

133 persons were allowed "protection" for the night in the police cells.

There is always a large number of persons committed for being "drunk and incapable," "drunk and disorderly," and "drunk and assault," in this burgh.

The force is efficient.

No. 8.—Banff (County of Banff).

Banff.

Population in 1861 - - - - - -	3,939
Strength of force - - - - - -	3
Population to each constable - - - -	1,313

One superintendent and two constables.

This force continues the same as formerly reported.

Two men employed to repair and clean the streets, assist the police if required.

The force is efficient.

No. 9.—Blairgowrie (County of Perth).

Blairgowrie.

Population in 1861 - - - - - -	3,600
Strength of force - - - - - - -	1
Population to each constable - - - -	3,600

This force continues to consist of one constable, assisted, if required, by two men who clean the streets and do other duties.

The lock-ups are still in a very bad state, as already frequently reported. At the time of my inspection I found the windows had been broken a great part of the winter, and the cells unfit for the confinement of prisoners.

Cities and Burghs.

This burgh might with great advantage unite with the county for police purposes.

The manufactures are increasing, and the population also, to a considerable extent.

The present force continues to be inefficient.

No. 10.—BRECHIN (County of Forfar).

Brechin.

Population in 1861	7,180
Strength of force	6
Population to each constable	1,196

One superintendent, one serjeant, and four constables, in two classes.

This force is the same as last year, and is efficient.

No. 11.—CROMARTY (County of Cromarty).

Cromarty.

Population in 1861	1,491
Strength of force	1
Population to each constable	1,491

This burgh continues to employ one constable, and is inefficient.

No. 12.—DUMBARTON (County of Dumbarton).

Dumbarton.

Population in 1861	8,253
Strength of force	7
Population to each constable	1,179

One superintendent, one serjeant, and five constables, in three classes.

This force continues the same as last year, and is efficient.

No. 13.—DUMFRIES (County of Dumfries).

Dumfries.

Population in 1861	10,440
Strength of force	7
Population to each constable	1,491

One superintendent, one serjeant, and five constables.

The above is the strength of the force as reported to me.

The superintendent was imprisoned for two months for assault, and after being liberated from gaol, was continued by the magistrates of the burgh for some time longer in his situation.

This force was not efficient either in numbers or discipline during last year.

A new superintendent has been recently appointed.

No improvement has been made in the police office, or lock-ups, which are very bad, as formerly reported.

No. 14.—DUNBAR (County of Haddington).

Dunbar.

Population in 1861	3,796
Strength of force	3
Population to each constable	1,265

One superintendent, and two constables.

This force is the same as last year; another man is employed to assist if required.

The force is efficient.

No. 15.

No. 15.—Dundee (County of Forfar).

Dundee.

Population in 1861 - - - - - -	90,425
Strength of force - - - - - -	116
Population to each constable - - - -	779

One superintendent, two lieutenants, four inspectors, two detectives, eight serjeants, and 99 constables, in three classes.

Two constables have been added to the force during last year.

The pay of the superintendent has been raised from 275 *l.* to 325 *l.*; the first lieutenant from 110 *l.* to 115 *l.*; and the second lieutenant from 80 *l.* to 85 *l.*; inspectors to 78 *l.* and 73 *l.* a year; serjeants 1 *s.* per week.

The other ranks remain the same as before.

There were 32 vacancies in the force (10 less than last year), 17 resignations and 15 dismissals; the great majority of these from the third or lowest paid class.

No new stations have yet been erected in the eastern or western parts of the town.

Dundee has become so extensive and populous, that the central office is not conveniently situated for the police business of the distant parts of the burgh.

Three married and 16 single constables are provided with lodgings in the central and Lochee stations.

This force is composed of a particularly fine body of men, well clothed and equipped, and maintained in a good state of efficiency and discipline.

No. 16.—Dunfermline (County of Fife).

Dunfermline.

Population in 1861 - - - - - -	8,401
Strength of force - - - - - - -	6
Population to each constable - - - - -	1,401

One superintendent and five constables, in one class.

This force continues the same as to numbers as last year, but there is no serjeant, merely five constables, all in one class, at 18 *s.* per week.

The lock-ups are very inferior, as formerly reported.

There were four changes in the force during last year.

The force is efficient.

No. 17.—City of Edinburgh (County of Edinburgh or Mid-Lothian).

Edinburgh.

Population in 1861 - - - - - -	168,098
Strength of force - - - - - -	351
Population to each constable - - - -	478

One superintendent, one first lieutenant, three lieutenants, three inspectors, 10 detectives, 30 serjeants (including one assistant serjeant), and 303 constables, in five classes (of whom seven are elderly men, and 12 assistant constables at 7 *s.* per week), making 351.

There are also maintained on the police establishment of the city a surgeon, two superintendent's clerks, one court officer, and two female turnkeys—357 persons in all.

The force remains the same as to numbers and rate of pay as formerly reported.

There were 75 vacancies in the force, being 10 more than last year (and 22 more than the year before), four deaths, 46 resignations, and 25 dismissals.

There are therefore 75 recruits with less than a year's service, and 20 (the seven elderly men, and the assistant serjeant, and 12 assistant constables) who have served too long, and should have been superannuated before now, with a retiring allowance or pension; but there is no provision of this kind for constables who have passed the best part of their lives in the force.

Of the seven elderly men, their average age is 61¼; average service 27⅔ years; of the assistant serjeant and 12 assistant constables the average age is 67, and their average service 31½ years.

Cities and Burghs.

These veteran constables, who have so long served the city, have nothing to look to when they are no longer able to perform the light duties that are now required of them.

A superannuation and retiring allowance fund is more called for in this force than in any other in Scotland.

No houses or lodgings are provided for any of the serjeants or constables, even at the stations where there are lock-ups, and where, at least, one serjeant must be in constant attendance.

The superintendent, lieutenants, and inspectors have either free houses or an allowance for lodging money, except the senior inspector.

The force is efficient.

No. 18.—City of Elgin (County of Elgin).

Elgin.

Population in 1861 - - - - - -	7,543
Strength of force - - - - - -	6
Population to each constable - - - -	1,257

One superintendent, one serjeant, and four constables, in two classes.

This force is the same as reported last year.

A constable was reduced for some time, and the serjeant having died, his place remained vacant for some time, but on the whole the force appears to have been efficient during the year.

A new superintendent has been appointed.

No. 19.—Forfar (County of Forfar).

Forfar.

Population in 1861 - - - - - -	9,258
Strength of force - - - - - -	6
Population to each constable - - - -	1,543

One superintendent, one serjeant, and four constables, in two classes.

This force remains the same as to numbers and rate of pay as before.

A new superintendent has been appointed.

The office and cells are kept clean, well ventilated, and fit for the confinement of prisoners in wet and bad weather.

The force is maintained in a satisfactory state of efficiency and discipline.

No. 20.—Forres (County of Elgin).

Forres.

Population in 1861 - - - - - -	3,508
Strength of force - - - - - -	2
Population to each constable - - - -	1,754

One superintendent and one constable.

This force has been in the same state as the year before, and appears to be efficient.

It is proposed to unite this burgh with the county of Elgin for police purposes.

No. 21.—Fraserburgh (County of Aberdeen).

Fraserburgh.

Population in 1861 - - - - - -	3,130
Strength of force - - - - - -	2
Population to each constable - - - -	1,565

I cannot report this force as efficient, there being only two constables, with 15*s.* per week.

The population of the burgh is very greatly increased in autumn, during the herring fishing.

This burgh might with much advantage unite with the county for police purposes.

No. 22.

No. 22.—Galashiels (County of Selkirk).

Galashiels.

Population in 1861	6,944
Strength of force	6
Population to each constable	1,157

One superintendent, one serjeant, and four constables, in two classes.

Two constables have been added to the force during last year, the boundaries of the burgh having been extended, and a greater population included.

The cells are very cold, and unprovided with means of warming or drying them in cold weather.

The force is efficient.

This force might with advantage unite with the county of Selkirk for police purposes.

No. 23.—City of Glasgow (County of Lanark).

Glasgow.

Population in 1861	403,276
Strength of force	751
Population to each constable	537

One chief constable, six superintendents, 19 lieutenants, 23 inspectors, 23 detectives, 48 serjeants, 631 constables in four classes, making 751 effectives.

In addition to the above, there are maintained in the police establishment of the city, one surgeon, five district surgeons, two powder magazine keepers, three storekeepers and tailors, four lamp-trimmers, 11 waiters, and six female turnkeys—total 783 persons.

The force has been increased last year by 28 men, one inspector and 27 constables.

There were eight deaths, 153 resignations, 63 dismissals, 15 desertions, and two superannuations. Sixty of the beats were twice vacated during the year.

The greater part of these resignations, desertions, and dismissals were from the fourth class, and owing to the many better paid trades and professions, and the temptations to emigrate to our colonies and America.

In order to go along with the increased rate of wages of the present time, the municipal authorities of Glasgow, with their usual foresight and liberality, have again resolved to raise the scale of pay of their police force, and offer more rapid promotion to those who conduct themselves well.

By the new scale recruits will enter the fifth class at 16 *s.* per week, and after three months' service with good conduct will be put into the fourth class, with 18 *s.*; and after 12 months' more good service will enter the third class, with 20 *s.* per week. Thus, a man entering the Glasgow police at 16 *s.* per week, may, after 15 months' good service, receive 20 *s.*, with the prospect and a "fair field" for promotion by merit to the second and first classes, and higher grades in the force.

A superannuation fund is much required in this large and important force, there being many constables who should now retire from the service.

111 married and 101 single men are provided with good lodgings at a moderate rent, in station houses, and other premises, leased and fitted up for them.

Improvements are to be made at the Cowcaddens' station, which will considerably increase the accommodation that was much required there; and it is proposed to build a new station in the Calton district.

This force continues to be maintained in a high state of efficiency and discipline.

Cities and Burghs.

No. 24.—Govan (County of Lanark).

Govan.

Population in 1861 - - - - - -	12,092
Strength of force - - - - - -	14
Population to each constable - - - -	864

One superintendent, one inspector, one serjeant, and 11 constables.

The same as to numbers as formerly reported.

The pay has been raised, of the superintendent 25 *l.*, the inspector 3 *s.* per week, and the serjeant 2 *s.* per week.

There were nine vacancies in the force during the year, four resignations, and five dismissals.

A new police office, to provide lodgings for the constables, and lock-ups for prisoners, is being built, when the present temporary office and cells will be done away with.

This force has only been organized since the formation of the burgh, about two years ago, and appears to be in a good state of efficiency and discipline.

No. 25.—Greenock (County of Renfrew).

Greenock.

Population in 1861 - - - - - -	42,100
Strength of force - - - - - -	100
Population to each constable - - - -	421

One superintendent, four lieutenants, two inspectors, three detectives, nine serjeants, and 81 constables, in five classes.

During last year the boundaries of this burgh have been extended, which has added a considerable increase to the population; the precise increase by last census is not ascertained, but it is believed that the population of the burgh now under charge of the police is about 50,000.

This increase has required a reorganization of the police force, and an addition of six men, and alteration in the rates of pay.

The force now consists of a superintendent, with 250 *l.* a year; four lieutenants, one at 95 *l.*, one at 90 *l.*, and two at 80 *l.* a year; two inspectors at 72 *l.* a year; three detectives, one at 28 *s.* per week, with the rank of inspector, and two at 25 *s.* per week; nine serjeants, three first class, at 24 *s.*, six second class, 23 *s.* per week; constables, 14 first class, at 21 *s.*; 25 second class, at 20 *s.*; 25 third class, at 18 *s.*; 14 fourth class, at 17 *s.*; and three fifth class (probationary), at 14 *s.* per week.

There has been, as usual, in this burgh, a great many vacancies in the force, 43 in all; 13 less than the year before; three deaths, 20 resignations, 19 dismissals, and one superannuation.

A great proportion—43 per cent.—of the force is therefore composed of recruits of less than one year's service.

These numerous changes are owing to the great prosperity of different trades and professions in which men of the description required for police constables can obtain higher remuneration and on easier terms, and with many hours less work.

The great difficulty of procuring good lodgings at a moderate rate (owing to the overcrowded state of the town), for themselves and their families induces many good men to leave the Greenock police and remove to other places. If lodgings were provided by the municipal authorities, as in Glasgow and, to some extent, in Dundee, men would be willing to remain much longer in the police service.

The increased number of convictions in the police courts proves the necessity for the increase to the force.

Notwithstanding the numerous changes, the force appears to have been maintained in a state of efficiency and discipline during the past year.

Greenock is the only burgh in Scotland in which there is a superannuation fund established for its police force.

No. 26.

No. 26.—HADDINGTON (County of Haddington).

Haddington.

Population in 1861	3,897
Strength of force	2
Population to each constable	1,948

One superintendent and one constable.

This force continues the same as last year, and I cannot yet report it in a state of efficiency.

No. 27.—HAMILTON (County of Lanark).

Hamilton.

Population in 1861	10,686
Strength of force	9
Population to each constable	1,187

One superintendent, two serjeants, and six constables, in two classes.

This force is the same as to numbers and rate of pay as when last reported.

The new office and lock-ups are clean and kept in good order.

The force is efficient.

No. 28.—HAWICK (County of Roxburgh).

Hawick.

Population in 1861	10,684
Strength of force	9
Population to each constable	1,187

One superintendent, two serjeants, and six constables, in two classes.

This force is the same as to numbers and rate of pay as the year before.

The new office and cells were kept in good order.

The fire-engines are in charge of the police, who act with the fire brigade.

The force has been efficient during the last year.

No. 29.—HELENSBURGH (County of Dumbarton).

Helensburgh.

Population in 1861	4,749
Strength of force	8
Population to each constable	593

One superintendent, one serjeant, and six constables.

This force continues the same as to numbers as the year before.

The pay of the superintendent has been raised from 80 *l.* to 100 *l.* a year, and the serjeants from 18 *s.* to 20 *s.* per week, and the constables 1 *s.* per week.

There was one resignation during the year.

No improvement has been made in the lock-ups, which are very bad.

The force is efficient.

No. 30.—INVERNESS (County of Inverness).

Inverness.

Population in 1861	12,499
Strength of force	16
Population to each constable	781

One superintendent, three serjeants, and 12 constables, in two classes.

This force has been increased by the appointment of an additional constable.

The population has greatly increased since the last census in 1861, and the extension of the railways.

The force is efficient.

Cities and Burghs.

Johnstone.

No. 31.—JOHNSTONE (County of Renfrew).

Population in 1861 - - - - - -	7,007
Strength of force - - - - - - -	6
Population to each constable - - - - -	1,168

One superintendent, one serjeant, and four constables.

The force is the same in number as when last reported.

The pay of the superintendent has been raised from 70 *l.* to 80 *l.* a-year; the serjeants from 21 *s.* 6 *d.* to 22 *s.* 6 *d.*, and the constables 2 *s.* per week.

Three men resigned, and one was dismissed.

The force is efficient.

No. 32.—KELSO (County of Roxburgh).

Kelso.

Population in 1861 - - - - - -	4,309
Strength of force - - - - - -	3
Population to each constable - - - -	1,436

One superintendent and two constables.

This force continues as formerly reported, inefficient as to numbers, having only a superintendent and two constables, too few for so important a burgh.

Kelso might, with much advantage, unite with the county for police purposes.

No. 33.—KILMARNOCK (County of Ayr).

Kilmarnock.

Population in 1861 - - - - - -	20,698
Strength of force - - - - - -	18
Population to each constable - - - -	1,150

One superintendent, one inspector, three serjeants, and 13 constables, in four classes.

This force has been reduced by one man, during last year, but the pay of the rest of the force has been increased; the superintendent from 140 *l.* to 145 *l.* a year; the inspector and detective, 23 *s.* to 24 *s.* 6 *d.* a week; serjeants, 20 *s.* and 22 *s.* to 22 *s.* and 24 *s.*; and constables, merit class 21 *s.*, 1st class 20 *s.*, 2nd class 18 *s.*, and 3d class 16 *s.* a week.

The men are allowed 20 *s.* each a year for boot money.

There were three resignations and three dismissals.

The population of Kilmarnock has increased considerably during the last few years.

The increase of the pay has had a good effect on the force, by inducing good men to enter and remain in the service, and the 18 men perform the duties as efficiently as the 19 the year before.

The clothing is good, and the force in a satisfactory state of efficiency and discipline.

No. 34.—KIRKINTILLOCH (County of Dumbarton).

Kirkintilloch.

Population in 1861 - - - - - -	7,486
Strength of force - - - - - -	4
Population to each constable - - - -	1,871

One superintendent, one serjeant, and two constables, in two classes.

This force remains the same as to numbers as at my last report, and appears to have been efficient during last year.

No. 35.—KIRRIEMUIR (County of Forfar).

Kirriemuir.

Population in 1861 - - - - - -	3,425
Strength of force - - - - - -	1
Population to each constable - - - -	3,425

A new superintendent has been appointed, and is the only regular police officer. Three men who light lamps and clean the streets, assist if required, but I cannot report this as an efficient police force.

The

The office and lock-up are very bad, as formerly reported, and when any persons are taken into custody and detained for a night, one of the men who assist is required to remain in the lock-up with them.

No. 36.—Leith (County of Edinburgh).

Leith.

Population in 1861 - - - - - -	33,628
Strength of force - - - - - -	61
Population to each constable - - - -	551

One superintendent, one inspector, three detectives, seven serjeants, and 49 constables, in three classes.

In my former reports I recommended that the harbour and docks of Leith, with their great amount of shipping and stores, should be placed under charge of the burgh police, instead of under a separate force.

This has been approved of and carried into effect by the town council, and the "Docks Commissioners," during last year, and I am glad to learn that it gives satisfaction to all parties concerned.

Twenty men were added to the burgh force to enable this arrangement to be carried out; one detective, two serjeants, and 17 constables, making the strength of the whole force 61 men.

There are also two extra constables on Sundays.

This force appears sufficient for the present, but if, after a fair trial, a further increase should be found necessary, the authorities are prepared to agree to it.

Some of the constables are provided with good lodgings at Newhaven, and if a suitable site or premises can be obtained, more of the force will be lodged in a similar manner.

The offices and cells are kept in good order.

There were 23 vacancies in the force last year, one death, 17 resignations, and five dismissals.

Although a considerable proportion of this force is composed of recruits, owing to the numerous vacancies that have been filled up, and the large addition that has been made, I consider it has been maintained in a satisfactory state of efficiency and discipline.

No. 37.—Macduff (County of Banff).

Macduff.

Population in 1861 - - - - - -	3,067
Strength of force - - - - - -	1
Population to each constable - - - -	3,067

This burgh continues to employ their "burgh officer" as their only constable, and I can only report it inefficient as a police force.

The lock-up is a very bad one, as before reported.

No. 38.—Maryhill (County of Lanark).

Maryhill.

Population in 1861 - - - - - -	5,225
Strength of force - - - - -	6
Population to each constable - - - -	871

One superintendent, one serjeant, and four constables, in two classes.

This force has been reduced by one constable during the year, but the number is to be made up to its former strength.

The population of this burgh is increasing to a considerable extent.

Two constables resigned during the year.

The force appears to have been efficient during the year.

No. 39.—Maxwelltown (County of Kirkcudbright).

Maxwelltown.

Population in 1861 - - - - - -	3,646
Strength of force - - - - - -	2
Population to each constable - - - -	1,823

One superintendent and one constable.

A constable has been added to the force during the year; but I cannot yet report this force as efficient.

Cities and Burghs.

This burgh might, with advantage, unite with the county for police purposes.

No. 40.—Montrose (County of Forfar).

Montrose.

Population in 1861 - - - - - -	14,563
Strength of force - - - - - -	15
Population to each constable - - - -	970

One superintendent, three serjeants, and 11 constables, in two classes.

This force is the same as to numbers as formerly reported.

The pay of the force has been increased: serjeants, 1 *s.* per week; 1st class, constables, from 18 *s.* to 19 *s.*; 2d, from 16 *s.* to 18 *s.* per week; the 3d class receive 16*s.* per week, and it has been resolved to promote men from the 3d to the 2d class after 12 months' service, with good conduct.

The office and cells are kept in good order.

The force is in a state of efficiency and discipline.

No. 41.—Nairn (County of Nairn).

Nairn.

Population in 1861 - - - - - -	3,437
Strength of force - - - - - - -	1
Population to each constable - - - -	3,437

The "burgh officer" is the only constable maintained in this burgh.

The place used as a lock-up is a bad one, and is not attached to any office or the residence of the constable.

There is no police office in the burgh.

I cannot report this as an efficient police force.

No. 42.—Newburgh (County of Fife).

Newburgh.

Population in 1861 - - - - - -	2,300
Strength of force - - - - - -	1
Population to each constable - - - -	2,300

There is still only one constable employed in this burgh, which is not an efficient police force.

No. 43.—Paisley (County of Renfrew).

Paisley.

Population in 1861 - - - - - -	47,419
Strength of force - - - - - -	44
Population to each constable - - - -	1,078

One superintendent, one lieutenant, one inspector, four serjeants, and 37 constables, in three classes.

A serjeant and two constables have been added to this force during last year.

There were five vacancies; two resignations, two dismissals, and one desertion.

The rates of pay continue the same as before.

This force appears now sufficient in numbers for its duties, and has been efficient in discipline during the year.

No. 44.—Partick (County of Lanark).

Partick.

Population in 1861 - - - - - -	10,917
Strength of force - - - - - -	15
Population to each constable - - - -	727

One superintendent, two serjeants, and 12 constables, in three classes.

The same as to numbers and rate of pay as when last reported.

There is again a large proportion of changes in this force; there have been seven resignations and four dismissals.

The office and cells are kept in good order.

The force has been efficient during the past year.

No. 45.—City of Perth (County of Perth).

Perth.

Population in 1861 - - - - - -	23,000
Strength of force - - - - - -	25
Population to each constable - - - -	920

One superintendent, two inspectors, two detectives, three serjeants, and 17 constables, in three classes.

This force remains the same as to numbers and rate of pay.

There were four resignations and two dismissals in the force during the year.

The cells are badly constructed, and deficient in light and ventilation; some of them require gas to be lighted in the day time when persons are confined in them.

The practice of allowing vagrants to lodge in the cells, which I reported last year, is still continued, causing much inconvenience to the police, and keeping the cells constantly in a dirty state; 386 persons were thus received in the police office during last year. Vagrants frequently bring infectious diseases with them, and vermin, to the injury of persons who may be afterwards confined in them, and to the constables in the office. This is a most improper use to make of the police office. Vagrants seem to consider they have right to claim lodgings there, and save themselves the expense of paying for them elsewhere.

The force is efficient in numbers and discipline.

No. 46.—Pulteneytown (County of Caithness).

Pulteneytown.

Population in 1861 - - - - about	5,000
Strength of force - - - - - - -	2
Population to each constable - - - -	2,500

This force is maintained by the "Commissioners of Pulteneytown," and consists of two constables, one at 46 *l.* a year, and another at 15 *s.* per week, assisted by a man who is employed by the "British Fisheries Society;" this I do not consider is an efficient police for this populous burgh, which is greatly increased during the herring fishing season.

No. 47.—Renfrew (County of Renfrew).

Renfrew.

Population in 1861 - - - - - -	3,731
Strength of force - - - - - -	4
Population to each constable - - - - -	932

One superintendent, one serjeant, and two constables, in two classes.

This force remains the same as last year, and is efficient.

No. 48.—Rothesay (County of Bute).

Rothesay.

Population in 1861 - - - - - -	7,122
Strength of force - - - - - -	5
Population to each constable - - - - -	1,424

One superintendent and four constables, in two classes.

An extra constable is employed during the summer months; the rest of the force remains the same as before reported.

The force appears to have been efficient during the past year.

No. 49.—Stirling (County of Stirling).

Stirling.

Population in 1861 - - - - - -	13,714
Strength of force - - - - - -	14
Population to each constable - - - -	979

One superintendent, two serjeants, and 11 constables, in two classes.

This force is the same in number as the previous year.

A small rise (of 6 *d.* per week) has been made to the pay of the serjeants and constables, but the rates are still low compared with other police forces.

There were two resignations and one dismissal during the year.

The force is efficient.

No. 50.—Stranraer (County of Wigtown).

Stranraer.

Population in 1861 - - - - - -	6,274
Strength of force - - - - - -	5
Population to each constable - - - -	1,254

One superintendent and four constables, in one class.

The Parliamentary burgh, as well as the Royal burgh and harbour, is now under charge of the police, which increases the population from 3,980 to 6,274, as at the last census.

The police force has been re-organised, and is now composed of a superintendent at 76 *l.* a year, and four constables in one class, at 16 *s.* per week. I consider this is now sufficient for the burgh of Stranraer, and to enable me to report it as efficient.

No. 51.—Wick (County of Caithness).

Wick.

Population in 1861 - - - - -	about	2,000
Strength of force - - - - - -		2
Population to each constable - - - -		1,000

This force consists of two constables, with another who is employed for two months during the herring fishing season.

I cannot report this force as efficient.

The place used as a lock-up is a very bad one, and was in a dirty state when I inspected it.

The police forces of the burghs of Wick and Pulteneytown might with great advantage be united and placed under one chief officer.

POLICE (SCOTLAND).

REPORT of the INSPECTOR of CONSTABULARY, for the Year ended 15th March 1866, made to Her Majesty's Principal Secretary of State, under the Provisions of the Statute 20 & 21 Vict. c. 72.

(Presented pursuant to Act of Parliament.)

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